



## Enhanced Co-Metabolic Pilot Test Report

*216 Paterson Plank Road Site, Carlstadt, NJ*

Submitted to:

**USEPA**

290 Broadway, 19th Floor  
New York, New York  
10007-1866

Submitted by:

**Golder Associates Inc.**

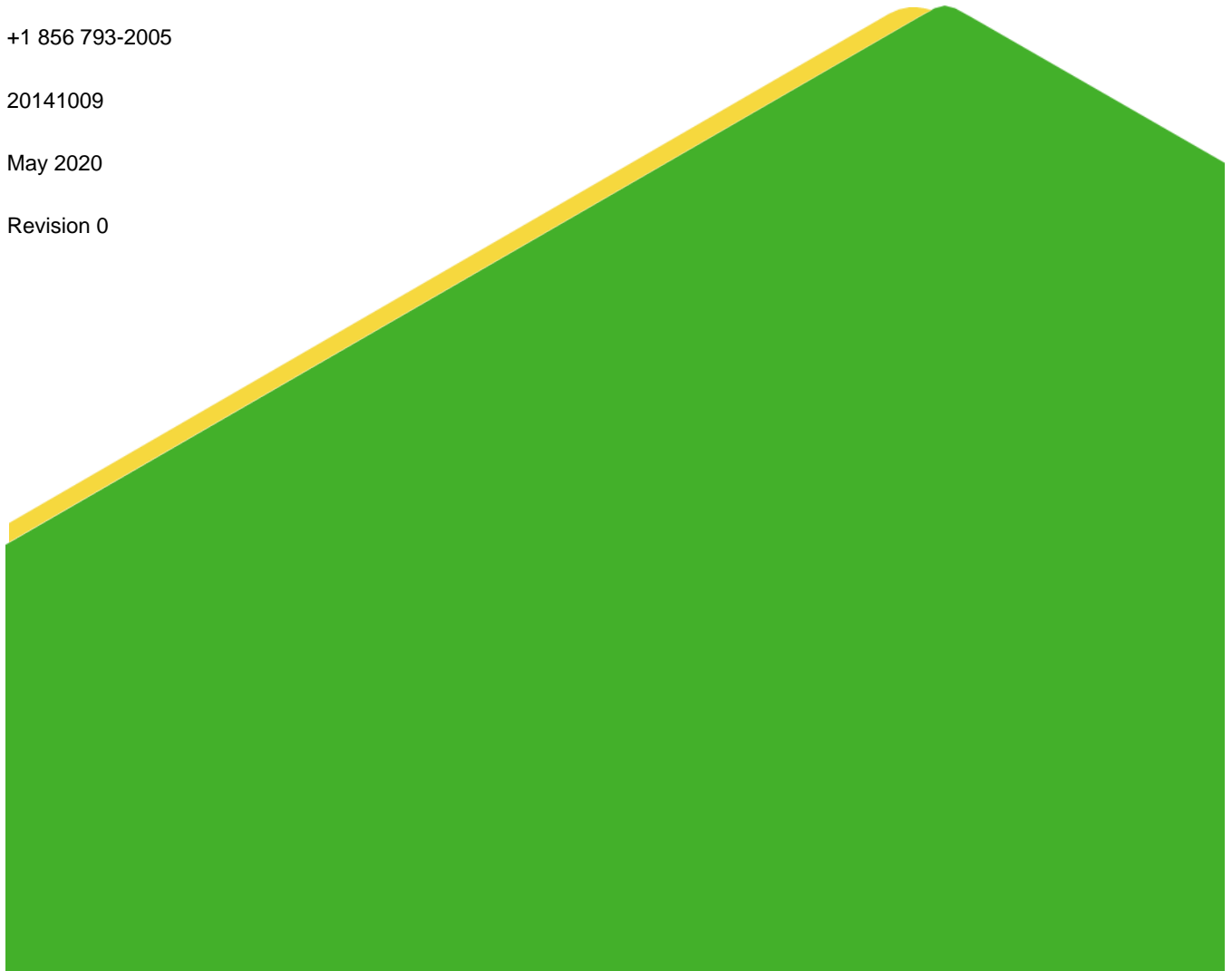
200 Century Parkway, Suite C Mt. Laurel, New Jersey, USA 08054

+1 856 793-2005

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May 2020

Revision 0



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# Table of Contents

<b>1.0 INTRODUCTION .....</b>	<b>1</b>
1.1 Description of Property .....	1
1.2 Site Geology .....	2
1.3 Southern Area Impacts .....	2
1.4 Biodegradation of 1,4 - Dioxane.....	2
<b>2.0 FIELD ACTIVITIES .....</b>	<b>2</b>
2.1 Well Installation and Modification.....	3
2.2 Hydraulic Testing .....	3
2.3 Groundwater Sampling .....	4
2.4 Injection Activities.....	4
2.5 Bromide Tracer Testing.....	4
<b>3.0 PILOT TEST RESULTS.....</b>	<b>5</b>
3.1 Tracer Testing Results .....	5
3.2 Baseline and Performance Monitoring Results.....	5
<b>4.0 CONCLUSIONS .....</b>	<b>6</b>
<b>5.0 REFERENCES .....</b>	<b>6</b>

## TABLES

Table 1	Monitoring Well Construction
Table 2	Groundwater Sampling Field parameters
Table 3	Validated Analytical Results
Table 4	Injection Details

## FIGURES

Figure 1	Site Location
Figure 2	Pilot Test Layout and 1,4-Dioxane Distribution
Figure 3	Geologic Cross-Section A-A'
Figure 4	Response to Bromide Injection
Figure 5	Propane Trend Plots
Figure 6	1,4-Dioxane Trend Plots

## **APPENDICES**

- Appendix A Well Information (Well Logs, well development forms, Form As, Form Bs)
- Appendix B Data Usability Summary Report and Baseline Results
- Appendix C USEPA EDD (on CD)

## 1.0 INTRODUCTION

On behalf of the 216 Paterson Plank Road Cooperating PRP Group (Group), Golder Associates Inc. (Golder) has prepared this Enhanced Co-metabolic Pilot Test Report that presents the results of the Pilot Test conducted in the Southern Area of Operable Unit 3 (OU-3) at the 216 Paterson Plank Road Site (Site<sup>1</sup>) in Carlstadt, New Jersey (see Figure 1).

On September 27, 2012, the United States Environmental Protection Agency (USEPA) issued a Record of Decision (ROD) (USEPA, 2012) for OU-3 identifying the selected remedy that addresses Site-related impacts to deep groundwater in the glacial deposits and bedrock. The selected remedy consists of in situ treatment of impacted groundwater in conjunction with Monitored Natural Attenuation (MNA) and Institutional Controls (IC). USEPA entered into a Consent Decree (CD) with the Group that was lodged on November 6, 2013 and addressed the implementation of the OU-3 remedial design (RD) and remedial action (RA). OU-3 is the final planned operable unit for the Site.

OU-3 is divided into two distinct areas: a Northern Area with contaminants consisting primarily of chlorinated hydrocarbons and a Southern Area where the primary contaminant is 1,4-dioxane. In accordance with the CD and the approved Remedial Design Work Plan (Golder, 2014), PDI activities were initiated at the Site in April 2015, and the PDI Report was submitted in April 2016. The PDI Report provided additional information to complete the remedial design for the northern area of OU-3, delineated the impacts in the Southern Area, and included a work plan to conduct a pilot test of In Situ Chemical Oxidation (ISCO) using alkaline activated persulfate in the Southern Area. The PDI Report (Golder, 2016a, b) was approved by USEPA on September 13, 2016. Remedial action in the Northern Area is in progress and is reported separately.

The ISCO Pilot Test in the Southern Area was subsequently completed and the associated Report (Golder, 2018) was approved by USEPA on October 26, 2018. A Preliminary Remedial Design Report – Southern Area Groundwater (Golder, 2019a) was prepared based on the Pilot Test and also included a recommendation to consider the possibility of utilizing co-metabolic biodegradation as an alternative in situ technology to treat 1,4-dioxane in the Southern Area. Based on recent studies at other Sites it was recommended that oxygen and propane be injected into groundwater to promote co-metabolic biodegradation of 1,4-dioxane by propanotrophs. An Enhanced Co-Metabolic Bioremediation Pilot Test Work Plan (Golder, 2019b) to field test this technology in parallel with the Southern Area Design was approved by USEPA on July 16, 2019.

The Pilot Test was designed to evaluate the enhancement of 1,4-dioxane biodegradation by subsurface addition of propane and oxygen and was completed in accordance with the approved Work Plan and a Discharge to Groundwater Permit-by-Rule Equivalency issued by the New Jersey Department of Environmental Protection (NJDEP) on October 3, 2019. This report presents the results of the Enhanced Co-metabolic Bioremediation (ECMB) Pilot Test.

### 1.1 Description of Property

The 6-acre 216 Paterson Plank Road property (Figure 2) is a former chemical recycling and waste processing facility, which ceased operation in 1980, and is located in a light industrial/commercial area of Carlstadt, New Jersey. The property is bordered to the southwest by Paterson Plank Road, to the northwest by Gotham Parkway, to the southeast by a trucking company, and to the northeast by Peach Island Creek. The Site was placed on USEPA's National Priorities List (NPL) in 1983 and has been the subject of extensive investigations as described

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<sup>1</sup> The Site is also referred to as the former Scientific Chemical Processing Site or SCP Site. The Site includes the 216 Paterson Plank Road property and related off-property groundwater impacts.

in the Final Off-Property Groundwater Investigation Report (Golder, 2008). A summary of the geology, hydrogeology and the general nature and extent of 1,4 dioxane contamination is provided in the following sections.

## 1.2 Site Geology

The stratigraphy at the Site consists of the following units, from youngest to oldest:

- Man-Made Fill
- Marine and Marsh Sediments
- Glaciolacustrine Varved Deposits
- Glacial Till
- Bedrock

The geologic units that are relevant to OU-3 include the Glaciolacustrine Varved Unit, which serves as a confining unit, and the underlying Glacial Till and Bedrock Units. A cross-section through the ECMB Pilot Test area is shown in Figure 3.

## 1.3 Southern Area Impacts

Groundwater impacts in the southern area of OU-3 consist primarily of 1,4-dioxane. Aquifer profile borings in 2009, 2011 and 2015 (Golder, 2010, 2012 & 2016) have established that 1,4-dioxane impacts are limited to the till (particularly the shallower soft till) and the highest 1,4-dioxane concentrations occur within a relatively narrow zone parallel to Paterson Plank Road (Figure 2). Although remediation by ISCO was identified as an appropriate treatment approach for 1,4-dioxane in the southern area groundwater, recent studies have shown that bioremediation can also be an effective in situ treatment approach to mitigate 1,4-dioxane impacts.

## 1.4 Biodegradation of 1,4 - Dioxane

Biodegradation of 1,4-dioxane proceeds by two pathways: aerobic, metabolic biodegradation (bacteria metabolize 1,4-dioxane as a sole source of carbon and energy) and aerobic, co-metabolic biodegradation (enzymes produced by bacteria during consumption of growth substrates fortuitously degrade 1,4-dioxane) (Chiang et al., 2012; Kim et al., 2009; Lippincott et al., 2015; Mahendra & Alvarez-Cohen, 2006; Masuda et al., 2012; Nakamiya et al., 2005; Parales et al., 1994; Vainberg et al., 2006; Zenker et al., 2003). Studies have shown that propanotrophic bacteria (i.e., propanotrophs) which utilize propane as a carbon growth substrate, produce a monooxygenase enzyme (propane monooxygenase) that can degrade 1,4-dioxane. Because propanotrophic activity is controlled by the availability of the propane growth substrate and not 1,4-dioxane, co-metabolic processes enhanced by the addition of propane gas to groundwater have favorable degradation kinetics and are capable of reducing 1,4-dioxane concentrations to low levels. Based upon the presence of propane monooxygenase enzyme (31 counts/milliliter) in a groundwater sample collected from MW-22D in September 2018, field pilot testing was performed to assess whether an ECMB strategy could be an effective treatment approach in the southern area of the Site.

## 2.0 FIELD ACTIVITIES

The Pilot Test objectives were to evaluate the feasibility and effectiveness of an ECMB approach to reduce 1,4-dioxane levels in groundwater as well as to evaluate the appropriate dosage of substrate (oxygen and propane) and delivery method to the subsurface to provide information for full-scale remedial design of the Southern Area.

Field activities included the following:

- Modification of existing monitoring well (MW-22D) to accommodate injections and installation of two new Pilot Test monitoring wells (MP19-1 and MP19-2)
- Groundwater sampling to establish baseline groundwater conditions and to evaluate the efficacy of injections during the Pilot Test.
- Injection of a conservative tracer (bromide) to evaluate movement of injected groundwater from the injection well to the monitoring wells independent of microbial activity.
- Extraction once per week (October 28, 2019 through February 24, 2019) of approximately 150 gallons of groundwater from an extraction well (MP16-2)
- Augmentation of extracted groundwater with propane and oxygen, and injection into an injection well (MW-22D) once per week (October 29, 2019 through February 24, 2019)

All field work was conducted in accordance with the Site Health and Safety Plan as presented in the approved Final Remedial Design Report for the Northern Area (Golder, 2017).

## 2.1 Well Installation and Modification

New till monitoring wells MP19-1 and MP19-2 were installed at the locations shown on Figure 2. The new well locations and spacing were based on observations made of the radius of influence during the ISCO pilot test and to optimize use of existing wells.

Drilling and installation of monitoring wells MP19-1 and MP19-2 was conducted by Summit Drilling Company (Summit), of Bridgewater, New Jersey, a New Jersey licensed drilling firm, following clearance of utilities identified through the One Call system by a geophysical survey conducted by Enviroprobe Services Inc. Each drilling location was initially excavated to 5 feet depth using soft dig methods. Hollow Stem Auger (HSA) methods were then used to install an 8-inch diameter permanent steel isolation casing into the varved clay prior to advancing a 4-inch core barrel and 6-inch override casing by roto sonic methods. Continuous soil cores were collected in 5-foot lengths and logged until the desired depth was reached. New monitoring wells MP19-1 and MP19-2 were screened at the bottom of the soft till unit (approximately 32 to 42 feet bgs), just above the lodgement till unit. The wells were constructed of 2-inch schedule 40 PVC casing with 10-foot (No. 10 slot) screens (see Table 1). The monitoring wells were completed at ground surface as flushmounts to accommodate property usage. Monitoring well MW-22D was also modified to serve as an injection well.

Containers of solid investigation derived waste (drill cuttings and PPE) were staged on-Site for characterization and disposal in accordance with USEPA guidance. Aqueous IDW (purge, development, and decontamination water) was added to the on-Site groundwater collection system tank for disposal off-site.

The new and modified wells were surveyed by MPF Land Surveying of Montville, New Jersey. Well construction information is provided in Table 1. Well logs, Form A's, Form B's, and well development forms are included in Appendix A.

## 2.2 Hydraulic Testing

Similar to observations in wells IP16-2 and MP16-1 during the ISCO pilot test, limited recharge was observed in new wells MP19-1 and MW19-2 during well development activities. In response to the low recharge rates, a short-term groundwater extraction step test was performed in MP16-2 to evaluate its capacity to provide groundwater for reinjection. The step test results indicated that while the extraction well had accommodated injection of 1,600

gallons over a few hours during the ISCO pilot test, it could accommodate a sustained extraction rate of only approximately 0.2 gpm. It was noted that these lower extraction and injectate volumes would result in a reduced treatment area.

## 2.3 Groundwater Sampling

Baseline samples were collected from the four pilot test wells (MW-22D, MP16-2, MP19-1, MP19-2) prior to initiation of injections and performance groundwater samples and field parameter measurements were also collected. Groundwater samples were collected in accordance with the methodologies described in the QAPP Addendum (Golder, 2019b) and the FSAP (Appendix B of the RDWP). In accordance with the workplan, baseline samples were analyzed for target compounds, which included volatile organic compounds (VOCs), dissolved gasses (methane and propane), 1,4-dioxane, and select natural attenuation parameters (i.e., nitrate, phosphate, iron, ammonia, sulfate, and total organic carbon (TOC)). Performance samples were analyzed for 1,4-dioxane, dissolved propane, and natural attenuation parameters. Laboratory analyses were performed by Test America (Edison, New Jersey and Burlington, Vermont) laboratories, and Pace Analytical<sup>2</sup> (Pittsburgh). All wells were purged and sampled using low-flow methods<sup>3</sup>. Field parameters were monitored during groundwater purging and immediately prior to sampling and are presented in Table 2.

Baseline samples for the ECMB Pilot Test were collected in October 2019 and performance monitoring samples were collected between November 5, 2019 through February 21, 2020. Validated analytical results are provided in Table 3.

## 2.4 Injection Activities

Injection of oxygen and propane augmented groundwater was conducted between October 29, 2020 and February 24, 2020 generally once per week as summarized in Table 4. Prior to each injection, groundwater was extracted from MP16-2 at a rate of approximately 0.2 gpm into a 250-gallon tote. Once 150 gallons of extracted groundwater was obtained, extracted groundwater was pumped from the tank using a centrifugal pump and infused with a 25% LEL propane:air mixture using a jet injector to achieve oxygen and propane concentrations of approximately 0.5 mg/L and 7 mg/L respectively. The infused groundwater was then re-injected at the mid-point of the MW-22D well screen at a flow rate of 1.4 gallons per minute (gpm). The injection back pressure was monitored at the infusion system and did not exceed 17 pounds per square inch (psi). Throughout the Pilot Test, a total of approximately 2,575 gallons of propane/oxygen infused groundwater<sup>4</sup> were injected into MW-22. The headspace of monitoring wells MP19-1 and MP1902 was monitored with a multigas (propane LEL) meter during the pressure injections; there were no detections.

## 2.5 Bromide Tracer Testing

During initial injections on October 29-30, 2019, conservative tracer testing was conducted by adding approximately 2.6 kg of potassium bromide to the injectate. The tracer test was conducted to evaluate both the hydraulic connectivity between the injection well and the pilot test monitoring wells (MP16-1, MP19-1 and MP19-2) and to assist in differentiating dilution and dispersion from microbial consumption when evaluating oxygen and propane concentrations in the monitoring wells. Prior to tracer injection, calibrated ion-selective electrodes with data logging capabilities were installed in monitoring wells MP16-2, MP19-1 and MP19-2 to record the dispersion of bromide in the treatment area. The well-mixed tracer solution was amended with the 25% LEL propane:air

<sup>2</sup> Formerly Microseeps, Inc.

<sup>3</sup> Due to low recharge rates in MP19-2, samples were collected from this well using low-volume methods

<sup>4</sup> Elevated pH levels were observed (likely as a result of the previous ISCO injections) and so food-grade citric acid was also used to amend the injectate in January and February 2020.

mixture prior to injection into MW-22D. On October 30, 2019, a second propane and bromide amended injection was completed.

### 3.0 PILOT TEST RESULTS

#### 3.1 Tracer Testing Results

As illustrated in Figure 4, bromide was detected in all three monitoring wells, indicating that the injectate migrated at least 20 feet from the injection well. Key observations were as follows:

- Bromide was detected in monitoring well MP19-1, located 11.2 feet from the injection well, approximately 11 hours following completion of the bromide injection on October 29. Peak bromide concentrations were observed one day after the second injection. Rapid transport of bromide was likely aided by enhanced hydraulic gradients caused by the extraction and injection. The second peak in bromide concentration is likely due to the displacement of groundwater following the second injection.
- Bromide response in monitoring well MP16-2, located 20.8 feet from the injection well, lagged that of MP19-1, with an initial response a day following the first injection (5 hours after the second injection) and a second response five days later. Bromide concentrations observed in MP16-2 were much lower than in MP19-1.
- The slowest well to respond to the injections was MP19-2, which is located 11 feet upgradient from the injection well and in a zone of lower conductivity. Bromide was detected in this well 8 days after the second injection.

Overall, the bromide tracer data indicate the pilot study monitoring network effectively monitors conditions in the treatment area, although transport conditions do not appear to be uniform.

#### 3.2 Baseline and Performance Monitoring Results

Baseline and performance groundwater sampling analytical results are summarized in Table 3 and detailed in Appendix B. Baseline sampling results indicated low levels of VOCs, as expected (see Appendix B), and elevated levels of 1,4-dioxane, ranging from 560 ug/L (MP19-1) to 2,400 ug/L (MP16-2).

As discussed above, hydrogeologic constraints limited both the groundwater extraction volume and rate, and the volume of groundwater that could be re-injected along with the associated mass of infused propane and oxygen. Thus, while propane and oxygen were successfully infused into the injectate solution at the expected concentrations, the limited mass of propane and oxygen did not allow significant influence beyond the injection well MW-22D. As shown in Table 3 and Figure 5, detections and consistent increase in dissolved propane levels were only observed in the injection well and downgradient monitoring well MP19-1 (located between the injection well and extraction well). While propane was occasionally detected in the other monitoring points, sustained concentrations were not observed and the maximum concentration of dissolved propane (39 ug/L) detected in MP19-1 in February 2020 is below dissolved propane levels typically targeted to promote co-metabolic biodegradation (Lippincott et al., 2015). Further, as presented in Table 3, dissolved oxygen levels fluctuated in MP19-1; and the aerobic conditions necessary for ECMB of 1,4-dioxane were not achieved. The dissolved oxygen levels and oxidation-reduction potential (ORP) values observed in MP16-2 or MP19-2 also did not indicate favorable modification of geochemical conditions in the vicinity of these monitoring points to promote ECMB of 1,4-dioxane.

Injection of oxygen and propane infused groundwater did promote favorable conditions locally in MW-22D. In particular, dissolved oxygen levels measured in MW-22D were generally above 3 mg/L between November 2019

and February 2020 indicating established and sustained aerobic conditions. Further, following injection initiation, dissolved propane levels increased and were sustained above baseline in MW-22D with concentrations ranging from 80 ug/L to 480 ug/L. However, despite attaining oxygen and propane levels favorable for ECMB of 1,4-dioxane, the injections did not have a pronounced effect on 1,4-dioxane concentrations (see trend plots in Figure 6). Concentrations of 1,4 dioxane increased during the early stages of the pilot test and exhibited subsequent reductions in the middle stages of the pilot test before leveling off. These 1,4-dioxane trends in MW-22D mirror 1,4-dioxane levels in MP16-2, the source of re-injected groundwater. The absence of 1,4-dioxane concentration differences between MW-22D and MP16-2 indicates that 1,4-dioxane biodegradation is not being materially enhanced even in MW-22D. Further, the general correlation of 1,4-dioxane variability in MP19-1 with MW-22D and MP16-2 suggests that 1,4-dioxane concentration changes within the treatment area are likely primarily due to mixing of groundwater within the treatment zone as opposed to biodegradation.

## 4.0 CONCLUSIONS

While dissolved oxygen and propane levels favorable for ECMB of 1,4-dioxane were achieved in the injection well MW-22D, the injection of infused groundwater had little measurable effect on 1,4-dioxane levels within the pilot testing period. Further, favorable levels of dissolved oxygen and propane were not observed to propagate from the injection well to other performance monitoring wells in the treatment area.

Overall, the pilot study did not demonstrate enhanced biodegradation of 1,4-dioxane, primarily as a result of the challenging hydrogeologic conditions that constrained the ability to extract and reinject sufficient groundwater to achieve the necessary gas infusion.

The Preliminary Design Report for the Southern Area will therefore be advanced to a Draft Final Remedial Design based upon in situ treatment using alkaline activated persulfate.

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### Table 1

WELL ID	WELL PERMIT No.	DATE OF COMPLETION	GROUND SURFACE ELEVATION (FT-MSL)	ELEVATION TOP OF INNER CASING (FT-MSL)	WELL DIAMETER & MATERIAL(S)	WELL DEPTH (FT BGS)	SCREEN LENGTH (FT)	SCREENED INTERVAL FORMATION
REMEDIAL INVESTIGATION MONITORING WELLS								
MW-22D (injection well)	2.6E+09	9/3/2002	6.77	6.41	4-INCH SS	42	10	TILL
ECMB PILOT TEST WELLS								
MP16-2	E201612573	11/2/2016	5.50	5.00	2-INCH PVC	35-45	10	TILL
MP19-1	E201908991	9/16/2019	5.60	5.31	2-INCH PVC	32-42	10	TILL
MP19-2	E201908992	9/16/2019	5.50	5.25	2-INCH PVC	32-42	10	TILL

Updated by: HAL 3/29/20

Checkd by: CNE 4/3/20

Table 2  
Groundwater Sampling Field Parameters  
Enhanced Co-Metabolic Pilot Test Report  
216 Paterson Plank NPL Site  
Carlstadt, New Jersey

Sample ID		MP16-2	MP16-2	MP16-2	MP16-2	MP16-2	MP16-2	MP16-2	MP16-2	MP16-2	MP16-2	MP16-2	MP16-2	MP16-2	MP16-2	MP16-2	MP16-2	MP19-1	MP19-1
Sample Date		10/15/2019	11/4/2019	11/13/2019	11/19/2019	11/26/2019	12/6/2019	12/13/2019	12/18/2019	1/3/2020	1/10/2020	1/17/2020	1/24/2020	1/31/2020	2/7/2020	2/14/2020	2/21/2020	10/18/2019	11/4/2019
Parameter	Unit																		
DO	mg/L	0	0	0	0.05	0	0	0	5.93	8.1	0	0	0	0	0	2.5	0	41	1.9
ORP	millivolts	-288	-171	-265	-152	-196	-214	-234	10	-161	-212	-188	-293	-265	-239	-117	-200	-54	-142
pH	SU	12.9	13.83	14	12.96	12.84	14	14	12.33	13.4	12.95	12.97	12.97	13	12.99	12.93	13.55	8.99	9
SC	ms/cm	42.4	33.2	28.8	59.7	33.9	44.7	33	6.7	28.3	34.1	38.4	38.2	31.5	38.1	24	15.2	4.5	5.17
Temperature	deg C	19.94	18.43	16.16	16.99	17.21	16.46	15.87	16.3	13.48	15	13.11	15.26	14.99	15.36	13.28	12.81	18.71	19.94
Turbidity	ntu	18.8	44.7	4.8	20.9	8.1	27.3	20.9	1.4	22.1	4.5	45.2	15.7	11.2	6	21.3	9.8	>1000	603

Sample ID		MP19-1	MP19-1	MP19-1	MP19-1	MP19-1	MP19-1	MP19-1	MP19-1	MP19-1	MP19-1	MP19-1	MP19-1	MP19-1	MP19-1	MP19-2	MP19-2	MP19-2	MP19-2
Sample Date		11/13/2019	11/19/2019	11/26/2019	12/6/2019	12/13/2019	12/18/2019	1/3/2020	1/10/2020	1/17/2020	1/24/2020	1/31/2020	2/7/2020	2/14/2020	2/21/2020	10/18/2019	11/4/2019	11/13/2019	11/19/2019
Parameter	Unit																		
DO	mg/L	0.16	1.2	0	0.08	8.98	3.47	2.73	0.9	2.63	1.07	0.6	0.97	0.58	0.37	0.63	0	5.88	1.92
ORP	millivolts	-43	-49	4	-160	94	177	54	99	110	-7	-33	-49	-33	-29	-3	50	-27	30
pH	SU	9.89	8.12	9.16	7.53	8.41	7.75	8.25	9.45	7.95	7.38	7.54	7.71	8.45	7.62	8.02	8.99	12.46	7.86
SC	ms/cm	6.1	5.1	4.7	3.9	5.9	5.5	5.5	6.6	6	5.97	5.36	6.17	5.65	5.41	3.48	3.77	3.8	5.9
Temperature	deg C	14.74	14.3	17.19	15.01	14.19	15.42	14.42	15.13	12.23	15.94	14.01	14.51	14.15	12.21	19.4	19.45	14.82	15.09
Turbidity	ntu	1000	92.1	>1000	622	>1000	927	471	>1000	687	619	437	108	341	>1000	841	0	210	160

Sample ID		MP19-2	MP19-2	MP19-2	MP19-2	MP19-2	MP19-2	MP19-2	MP19-2	MP19-2	MP19-2	MP19-2	MP19-2	MW-22D	MW-22D	MW-22D	MW-22D	MW-22D	MW-22D
Sample Date		11/26/2019	12/6/2019	12/13/2019	12/18/2019	1/3/2020	1/10/2020	1/17/2020	1/24/2020	1/31/2020	2/7/2020	2/14/2020	2/21/2020	10/15/2019	11/4/2019	11/13/2019	11/19/2019	11/26/2019	12/6/2019
Parameter	Unit																		
DO	mg/L	0.31	4.61	5.5	8.2	0	0.45	0.83	0.05	3.66	0.6	0.22	0.84	0	0	2.61	0	7.01	4.18
ORP	millivolts	138	-43	-149	42	2	-5	38	9	-42	52	-72	-64	-219	-189	-181	-84	-58	-159
pH	SU	8.65	8.23	11.76	8.86	8.63	11.36	9.76	7.85	8.29	7.98	8.19	8.1	2.85	13	13.06	12.64	12.76	12.94
SC	ms/cm	3.7	3.4	4.2	3.8	3.6	4.1	3.74	3.7	3.36	3.85	3.78	3.69	6.3	29.4	53.1	54.2	28.4	41.9
Temperature	deg C	16.21	14.21	14.32	13.85	13.8	14.57	8.13	15.15	13.63	13.09	9.49	11.43	21.44	18.4	16.18	16.72	15.37	14.95
Turbidity	ntu	13.2	64.8	28.3	7	0	3.9	35.9	2.3	3.3	0	0	9.6	14	55.1	4.3	73.4	57.8	51.2

Sample ID		MW-22D	MW-22D	MW-22D	MW-22D	MW-22D	MW-22D	MW-22D	MW-22D	MW-22D	MW-22D
Sample Date		12/13/2019	12/18/2019	1/3/2020	1/10/2020	1/17/2020	1/24/2020	1/31/2020	2/7/2020	2/14/2020	2/21/2020
Parameter	Unit										
DO	mg/L	7.18	9.73	5.87	5.66	4	4.89	3.98	1.09	3.64	4.28
ORP	millivolts	-126	-36	-120	-134	-103	23	-10	-34	-136	-116
pH	SU	12.74	12.65	12.98	13.85	12.88	9.86	10.68	9.98	12.78	13.3
SC	ms/cm	35.5	26.2	30.9	30.3	30.2	10.7	9.82	11.2	12.3	12.6
Temperature	deg C	14.48	15.22	14.92	14.8	11.58	15.36	13.68	14.63	11.57	13.42
Turbidity	ntu	51.7	43.8	42.3	74.2	28.4	70.7	15.5	33.4	0	95.2

**Units:**  
deg C - degrees Celsius  
mg/L - milligrams per liter  
ms/cm - milli-Siemens per centimeter  
ntu - Nephelometric Turbidity Unit  
SU - standard units

**Abbreviations:**  
DO - Dissolved Oxygen  
ORP - Oxidation-Reduction Potential  
SC - Specific Conductance

Table 3  
Enhanced Co-Metabolic Pilot Test Report  
Validated Analytical Results  
216 Paterson Plank NPL Site  
Carlstadt, New Jersey

Sample ID Sample Date N=Normal, FD=Field Duplicate		INJECTATE 12/17/2019 N			INJECTATE 1/2/2020 N			MP16-2 10/15/2019 N			MP16-2 11/4/2019 N			MP16-2 11/13/2019 N			MP16-2 11/19/2019 N			MP16-2 11/26/2019 N			MP16-2 11/26/2019 FD			MP16-2 12/6/2019 N			MP16-2 12/13/2019 N			MP16-2 12/18/2019 N			MP16-2 1/3/2020 N			MP16-2 1/3/2020 FD			MP16-2 1/10/2020 N			MP16-2 1/17/2020 N		
Parameter	Unit	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL
Dissolved Gases																																														
Methane	ug/L	58		0.5	150		0.5	390		0.5	450		0.5	660	J+	0.5	540		0.5	800		0.5	850		0.5	460		0.5	500	J+	0.5	140		0.5	740		0.5	610		0.5	580		0.5	1100		0.5
Propane	ug/L	510		0.1	120		0.1	< 0.1	U	0.1	< 0.1	U	0.1	0.09	J	0.1	0.084	J	0.1	0.17		0.1	0.18		0.1	0.12		0.1	0.11		0.1	2.3		0.1	0.18		0.1	0.17		0.1	0.15		0.1	0.19		0.1
Semivolatile Organic Compounds																																														
1,4-Dioxane	ug/L	NA			NA			2400		210	1500		190	2500		200	1400		200	2900		200	2800		200	2600		190	2500		200	990		100	2100	J	200	1700	J	200	1800		200	1500		190
Total Metals																																														
Iron	ug/L	NA			NA			216		100	83.8	J	100	57.9	J	100	130		100	80	J	100	91.3	J	100	443		100	185		100	32.5	J	100	700		100	800		100	122		100	312		100
Wet Chemistry Parameters																																														
Ammonia	mg/L	NA			NA			2.6		0.1	2.2		0.1	2.6		0.1	2.5		0.1	2.3		0.1	2.6		0.1	2.7		0.1	1.1		0.1	2.4		0.1	2.4		0.1	2.4		0.1	< 2.4	U	2.4	2		0.1
Nitrate as N	mg/L	NA			NA			1.33		0.1	< 0.1	R	0.1	< 0.1	U	0.1	< 0.1	R	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	0.39	J	0.1	< 0.1	UJ	0.1	< 0.1	UJ	0.1	< 0.1	UJ	0.1	< 0.1	UJ	0.1	< 0.1	R	0.1
Phosphorus	mg/L	NA			NA			0.44		0	0.4		0.1	0.56	J	0.1	0.45	J	0.1	0.49	J	0	0.55	J	0.1	0.4	J-	0.1	0.67	J+	0.3	< 0.99	U	1	0.48		0.1	0.52		0.1	< 0.45	UJ	0.5	0.35	J-	0
Sulfate	mg/L	NA			NA			391		30	217	J-	60	370	J-	60	424	J-	30	451	J-	60	489	J-	60	436	J-	30	334	J-	15	138	J-	9.6	335	J-	15	324	J-	15	321		24	327	J-	15
Total Organic Carbon	mg/L	NA			NA			8.4		1	6.2		1	8.3		1	8.9		1	8.5		1	9.1		1	7.4		1	6.7		1	4		1	6.7		1	6.6		1	7		1	7.7		1

Abbreviations

ID - Identification  
J - Estimated Result  
J- - Estimated Result; Low Bias  
J+ - Estimated Result; High Bias  
mg/L - Milligrams per Liter  
NA - Not Analyzed  
Qual - Interpreted Qualifier  
R - Result Rejected  
RDL - Reporting Detection Limit  
U - Non-Detect Result  
ug/L - Micrograms per Liter  
UJ - Non-Detect Result;  
RDL is Estimated

Table 3  
Enhanced Co-Metabolic Pilot Test Report  
Validated Analytical Results  
216 Paterson Plank NPL Site  
Carlstadt, New Jersey

Sample ID Sample Date N=Normal, FD=Field Duplicate		MP16-2 1/24/2020 N			MP16-2 1/31/2020 N			MP16-2 2/7/2020 N			MP16-2 2/14/2020 N			MP16-2 2/21/2020 N			MP19-1 10/18/2019 N			MP19-1 11/4/2019 N			MP19-1 11/13/2019 N			MP19-1 11/20/2019 N			MP19-1 11/26/2019 N			MP19-1 12/6/2019 N			MP19-1 12/13/2019 N			MP19-1 12/18/2019 N			MP19-1 1/3/2020 N			MP19-1 1/10/2020 N		
Parameter	Unit	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL			
Dissolved Gases																																														
Methane	ug/L	760		0.5	670	J+	0.5	810		0.5	410		0.5	830		0.5	45	J	0.5	210		0.5	85	J+	0.5	150		0.5	79		0.5	39		0.5	52	J+	0.5	7.8		0.5	42		0.5	120		0.5
Propane	ug/L	0.12		0.1	0.12		0.1	0.13		0.1	0.073	J	0.1	0.13		0.1	0.31	J	0.1	0.66		0.1	3.7		0.1	6.9		0.1	8.6		0.1	15		0.1	10		0.1	15		0.1	19		0.1	0.084	J	0.1
Semivolatile Organic Compounds																																														
1,4-Dioxane	ug/L	1600		200	1400		270	1500		200	1400		200	1600		97	560		42	740		96	820		100	780		100	1100		200	1400		190	1700		200	1500	J	200	1300		200	1200		200
Total Metals																																														
Iron	ug/L	143		100	158		100	667		100	266	J-	100	142		100	NA			904		100	2230		100	615		100	3430	J	100	936		100	537		100	1230		100	590		100	627		100
Wet Chemistry Parameters																																														
Ammonia	mg/L	2.1		0.1	2.2		0.1	2.1		0.1	1.4	J+	0.1	1.5		0.1	0.1		0.1	0.31		0.1	0.21		0.1	0.24		0.1	0.24		0.1	0.23		0.1	0.2		0.1	0.19		0.1	0.15		0.1	< 0.45	U	0.5
Nitrate as N	mg/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	R	0.1	0.17		0.1	< 0.1	UJ	0.1	< 0.1	U	0.1	< 0.1	UJ	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	UJ	0.1	< 0.1	UJ	0.1	< 0.1	UJ	0.1	< 0.1	UJ	0.1
Phosphorus	mg/L	< 0.51	UJ	0.5	< 0.41	UJ	0.4	0.49		0.1	0.38		0.1	0.3		0.1	0.61	J	0.1	0.063		0	0.48	J	0	0.2	J	0	0.8	J	0.2	< 0.32	UJ	0.3	0.16	J+	0	< 0.99	U	1	0.066		0	< 0.21	UJ	0.2
Sulfate	mg/L	354	J-	15	346	J-	15	672	J-	30	398	J-	12	311	J-	60	NA			222	J-	60	227	J-	60	308	J-	30	276	J-	12	298	J-	12	308	J-	15	305	J-	17	321	J-	15	304		24
Total Organic Carbon	mg/L	6.7		1	6.4		1	7		1	77		10	27.2		1	3		1	2.2		1	2.9		1	3.2		1	3.6		1	3.3		1	3.7		1	3.2		1	3.3		1	4.9		1

Abbreviations

ID - Identification  
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J- - Estimated Result; Low Bias  
J+ - Estimated Result; High Bias  
mg/L - Milligrams per Liter  
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Qual - Interpreted Qualifier  
R - Result Rejected  
RDL - Reporting Detection Limit  
U - Non-Detect Result  
ug/L - Micrograms per Liter  
UJ - Non-Detect Result;  
RDL is Estimated

Table 3  
Enhanced Co-Metabolic Pilot Test Report  
Validated Analytical Results  
216 Paterson Plank NPL Site  
Carlstadt, New Jersey

Sample ID Sample Date N=Normal, FD=Field Duplicate		MP19-1 1/17/2020 N			MP19-1 1/24/2020 N			MP19-1 1/31/2020 N			MP19-1 2/7/2020 N			MP19-1 2/14/2020 N			MP19-1 2/21/2020 N			MP19-2 10/18/2019 N			MP19-2 11/4/2019 N			MP19-2 11/13/2019 N			MP19-2 11/20/2019 N			MP19-2 11/26/2019 N			MP19-2 12/6/2019 N			MP19-2 12/13/2019 N			MP19-2 12/18/2019 N			MP19-2 1/3/2020 N		
Parameter	Unit	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL			
Dissolved Gases																																														
Methane	ug/L	2.2		0.5	47		0.5	45	J+	0.5	48		0.5	60		0.5	59		0.5	140		0.5	26		0.5	32	J+	0.5	40		0.5	18		0.5	84		0.5	39	J+	0.5	92		0.5	82		0.5
Propane	ug/L	5.2		0.1	14		0.1	24		0.1	26		0.1	39		0.1	26		0.1	NA			0.23		0.1	0.21		0.1	0.22		0.1	0.13		0.1	0.14		0.1	0.12		0.1	0.11		0.1	0.068	J	0.1
Semivolatile Organic Compounds																																														
1,4-Dioxane	ug/L	250		39	880		98	960		100	1100		100	1200		190	1000		100	1000		84	420		38	410		40	470		41	530		210	580		200	540		40	640		80	390		40
Total Metals																																														
Iron	ug/L	1260		100	917		100	957		100	623		100	1050	J-	100	1710		100	NA			266		100	94	J	100	167		100	156	J	100	167		100	150		100	152		100	194		100
Wet Chemistry Parameters																																														
Ammonia	mg/L	< 0.1	U	0.1	0.15		0.1	0.27		0.1	0.48		0.1	0.72	J+	0.1	0.22		0.1	0.27		0.1	< 0.1	U	0.1	< 0.1	U	0.1	0.068	J	0.1	0.051	J	0.1	0.053	J	0.1	0.1		0.1	0.13		0.1	0.17		0.1
Nitrate as N	mg/L	< 0.1	UJ	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	UJ	0.1	< 0.1	U	0.1	0.33	J-	0.1	0.32	J+	0.1	0.62	J-	0.1	0.32	J+	0.1	0.33	J+	0.1	0.6	J-	0.1	0.46	J	0.1	< 0.1	UJ	0.1
Phosphorus	mg/L	< 0.21	UJ	0.2	< 0.25	UJ	0.3	< 0.19	UJ	0.2	0.58		0.1	0.51		0.1	0.3		0	0.59	J	0.1	0.13		0	0.066	J	0	0.037	J	0	0.037	J	0	< 0.03	UJ	0	< 0.03	U	0	< 0.99	U	1	0.51		0.1
Sulfate	mg/L	389	J-	17	324	J-	15	335	J-	15	336	J-	15	333	J-	14	286	J-	60	NA			223	J-	60	235	J-	60	265	J-	30	251	J-	30	267	J-	15	273	J-	15	266	J-	15	279	J-	15
Total Organic Carbon	mg/L	118		10	24.1		1	8.7		1	5.9		1	22.9		1	11		1	3.3		1	3.4		1	2.6		1	2.5		1	2.5		1	2.4		1	2.4		1	2.7		1	3.7		1

Abbreviations

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Qual - Interpreted Qualifier  
R - Result Rejected  
RDL - Reporting Detection Limit  
U - Non-Detect Result  
ug/L - Micrograms per Liter  
UJ - Non-Detect Result;  
RDL is Estimated

Table 3  
Enhanced Co-Metabolic Pilot Test Report  
Validated Analytical Results  
216 Paterson Plank NPL Site  
Carlstadt, New Jersey

Sample ID Sample Date N=Normal, FD=Field Duplicate		MP19-2 1/10/2020 N			MP19-2 1/17/2020 N			MP19-2 1/24/2020 N			MP19-2 1/31/2020 N			MP19-2 2/7/2020 N			MP19-2 2/14/2020 N			MP19-2 2/21/2020 N			MW-22D 10/15/2019 N			MW-22D 10/15/2019 FD			MW-22D 11/4/2019 N			MW-22D 11/4/2019 FD			MW-22D 11/13/2019 N			MW-22D 11/13/2019 FD			MW-22D 11/19/2019 N			MW-22D 11/19/2019 FD		
Parameter	Unit	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL
Dissolved Gases																																														
Methane	ug/L	26		0.5	140		0.5	150		0.5	180	J+	0.5	8		0.5	130		0.5	27		0.5	730	J	0.5	820		0.5	120		0.5	140		0.5	170	J+	0.5	160	J+	0.5	230	J	0.5	170	J	0.5
Propane	ug/L	10		0.1	0.091	J	0.1	0.082	J	0.1	0.096	J	0.1	0.043	J	0.1	0.12		0.1	0.032	J	0.1	0.13	J	0.1	NA			300		0.1	330		0.1	84		0.1	80		0.1	90	J	0.1	67	J	0.1
Semivolatile Organic Compounds																																														
1,4-Dioxane	ug/L	310		220	790		97	220	J+	20	260		20	250		20	300		200	240		20	730		80	630		41	2100		190	2000		190	1800	J	190	1400	J	200	1800		200	1800		200
Total Metals																																														
Iron	ug/L	112		100	157		100	154		100	203		100	79.6	J	100	170	J-	100	99.6	J	100	6830		100	6690		100	1270		100	1120		100	74.4	J	100	88.3	J	100	400		100	411		100
Wet Chemistry Parameters																																														
Ammonia	mg/L	< 0.45	U	0.5	< 0.14	U	0.1	< 0.1	U	0.1	0.13		0.1	0.094	J	0.1	< 0.1	U	0.1	0.11		0.1	0.14		0.1	0.13		0.1	3.4		0.1	3.4		0.1	3.2		0.1	3.3		0.1	3.1		0.1	3.1		0.1
Nitrate as N	mg/L	< 0.1	UJ	0.1	< 0.1	UJ	0.1	0.14		0.1	< 0.1	U	0.1	0.099	J	0.1	< 0.1	U	0.1	0.11	J-	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	UJ	0.1	< 0.1	UJ	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	UJ	0.1	< 0.1	UJ	0.1
Phosphorus	mg/L	< 0.03	UJ	0	< 0.03	UJ	0	< 0.25	UJ	0.3	< 0.03	U	0	0.2		0	0.25		0	0.34		0	0.057		0	0.049		0	0.55		0.1	0.55		0.1	0.48	J	0.1	0.48	J	0.1	0.49	J	0	0.5	J	0
Sulfate	mg/L	263		24	279	J-	14	277	J-	15	289	J-	15	274	J-	15	274	J-	9	242	J-	60	233		12	221		60	293	J-	60	290	J-	60	299	J-	60	302	J-	60	298	J-	60	321	J-	30
Total Organic Carbon	mg/L	2.2		1	2.9		1	2.5		1	1.9		1	2		1	2.3		1	2		1	2.8		1	2.8		1	8.6		1	8.5		1	9.2		1	8.9		1	8.8		1	9.2		1

Abbreviations

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R - Result Rejected  
RDL - Reporting Detection Limit  
U - Non-Detect Result  
ug/L - Micrograms per Liter  
UJ - Non-Detect Result;  
RDL is Estimated

Table 3  
Enhanced Co-Metabolic Pilot Test Report  
Validated Analytical Results  
216 Paterson Plank NPL Site  
Carlstadt, New Jersey

Sample ID Sample Date N=Normal, FD=Field Duplicate		MW-22D 11/26/2019 N			MW-22D 12/6/2019 N			MW-22D 12/6/2019 FD			MW-22D 12/13/2019 N			MW-22D 12/13/2019 FD			MW-22D 12/18/2019 N			MW-22D 12/18/2019 FD			MW-22D 1/3/2020 N			MW-22D 1/10/2020 N			MW-22D 1/10/2020 FD			MW-22D 1/17/2020 N			MW-22D 1/17/2020 FD			MW-22D 1/24/2020 N			MW-22D 1/24/2020 FD			MW-22D 1/31/2020 N		
Parameter	Unit	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL
Dissolved Gases																																														
Methane	ug/L	75		0.5	150		0.5	140		0.5	180	J+	0.5	170	J+	0.5	63		0.5	63		0.5	160		0.5	160		0.5	160		0.5	190		0.5	170		0.5	160		0.5	160		0.5	150	J+	0.5
Propane	ug/L	260		0.1	250		0.1	230		0.1	120		0.1	120		0.1	480		0.1	470		0.1	150		0.1	270		0.1	260		0.1	250		0.1	220		0.1	250		0.1	250		0.1	250		0.1
Semivolatile Organic Compounds																																														
1,4-Dioxane	ug/L	2100		200	2600		200	2400		200	2100		200	2100		200	2300		200	2000	J	200	1900	J	200	2100		200	1800		200	1200		190	1100		97	1200		200	1400		100	1200		200
Total Metals																																														
Iron	ug/L	156	J	100	334		100	318		100	353		100	331		100	321	J	100	423		100	192		100	562	J	100	448	J	100	195		100	218		100	1620		100	1510		100	798		100
Wet Chemistry Parameters																																														
Ammonia	mg/L	2.9		0.1	2.3		0.1	2.2		0.1	2.2		0.1	2		0.1	2		0.1	2.1		0.1	< 2.2	U	2.2	< 2.1	U	2.1	2.2		0.1	2.2		0.1	2.2		0.1	2.2		0.1	2.2		0.1	1.9		0.1
Nitrate as N	mg/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	UJ	0.1	< 0.1	UJ	0.1	< 0.1	UJ	0.1	< 0.1	UJ	0.1	< 0.1	UJ	0.1	< 0.1	UJ	0.1	< 0.1	UJ	0.1	< 0.1	UJ	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
Phosphorus	mg/L	0.59	J	0.2	0.7	J-	0.1	0.67	J-	0.1	0.77	J+	0.1	0.79	J+	0.1	< 0.99	U	1	< 0.99	U	1	0.4		0.1	< 0.47	UJ	0.5	< 0.47	UJ	0.5	< 0.29	UJ	0.3	< 0.28	UJ	0.3	< 0.25	UJ	0.3	< 0.25	UJ	0.3	< 0.48	UJ	0.5
Sulfate	mg/L	327	J-	30	341	J-	15	309	J-	30	343	J-	15	342	J-	15	304	J-	23	321	J-	22	331	J-	15	331		24	329		24	318	J-	25	336	J-	15	362	J-	15	358	J-	15	367	J-	15
Total Organic Carbon	mg/L	9.4		1	7.3		1	7.3		1	6.9		1	6.8		1	6.5		1	6.4		1	6.8		1	7.2		1	7.1		1	7		1	7.1		1	1030		100	1000		100	909		50

Abbreviations

ID - Identification  
J - Estimated Result  
J- - Estimated Result; Low Bias  
J+ - Estimated Result; High Bias  
mg/L - Milligrams per Liter  
NA - Not Analyzed  
Qual - Interpreted Qualifier  
R - Result Rejected  
RDL - Reporting Detection Limit  
U - Non-Detect Result  
ug/L - Micrograms per Liter  
UJ - Non-Detect Result;  
RDL is Estimated

Table 3  
Enhanced Co-Metabolic Pilot Test Report  
Validated Analytical Results  
216 Paterson Plank NPL Site  
Carlstadt, New Jersey

Sample ID Sample Date N=Normal, FD=Field Duplicate		MW-22D 1/31/2020 FD			MW-22D 2/7/2020 N			MW-22D 2/7/2020 FD			MW-22D 2/14/2020 N			MW-22D 2/14/2020 FD			MW-22D 2/21/2020 N			MW-22D 2/21/2020 FD		
Parameter	Unit	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL
Dissolved Gases																						
Methane	ug/L	150	J+	0.5	270		0.5	270		0.5	220		0.5	140		0.5	110		0.5	110		0.5
Propane	ug/L	240		0.1	92		0.1	94		0.1	370		0.1	380		0.1	400		0.1	400		0.1
Semivolatile Organic Compounds																						
1,4-Dioxane	ug/L	1100		130	1500		100	1500		100	1700		200	1700		200	1500		98	1500		99
Total Metals																						
Iron	ug/L	818		100	324		100	357		100	215	J-	100	201	J-	100	330		100	340		100
Wet Chemistry Parameters																						
Ammonia	mg/L	2		0.1	1.9		0.1	1.8		0.1	1.7	J+	0.1	1.7	J+	0.1	1.9		0.1	1.9		0.1
Nitrate as N	mg/L				< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	UJ	0.1	< 0.1	UJ	0.1
Phosphorus	mg/L	< 0.48	UJ	0.5	0.87	J	0.3	0.5	J	0.1	2.9	J	0.3	0.52	J	0.1	1.2	J	0.2	0.5	J	0.1
Sulfate	mg/L				442	J-	15	381	J-	15	400	J-	16	399	J-	16	386	J-	60	371	J-	60
Total Organic Carbon	mg/L	892		50	978		25	1010		25	334		20	326		20	232		20	243		20

Abbreviations

ID - Identification  
J - Estimated Result  
J- - Estimated Result; Low Bias  
J+ - Estimated Result; High Bias  
mg/L - Milligrams per Liter  
NA - Not Analyzed  
Qual - Interpreted Qualifier  
R - Result Rejected  
RDL - Reporting Detection Limit  
U - Non-Detect Result  
ug/L - Micrograms per Liter  
UJ - Non-Detect Result;  
RDL is Estimated

**Table 4**  
**Enhanced Co-Metabolic Pilot Test Report**  
**Injection Details**  
**216 Paterson Plank NPL Site**  
**Carlstadt, NJ**

<b>Date</b>	<b>Approximate Volume in Tote Prior to Injection (gallons)</b>	<b>Approximate Volume in Tote after Injection (gallons)</b>	<b>Volume Injected (gallons)</b>	<b>Average Injection Pressure (psi)</b>
10/29/2019	150	100	50	12
10/30/2019	150	0	150	11
11/5/2019	175	25	150	16
11/6/2019	150	20	130	14
11/22/2019	175	0	175	16
11/27/2019	150	15	135	15
12/3/2019	150	15	135	15
12/12/2019	150	0	150	16
12/17/2019	150	0	150	15
12/23/2019	150	0	150	NR
1/2/2020	150	0	150	NR
1/9/2020	150	0	150	15
1/16/2020	150	0	150	NR
1/22/2020	150 (1)	0	150	15
1/30/2020	150 (1)	0	150	15
2/6/2020	150 (1)	0	150	15
2/13/2020	150 (1)	0	150	14
2/24/2020	150 (1)	0	150	14

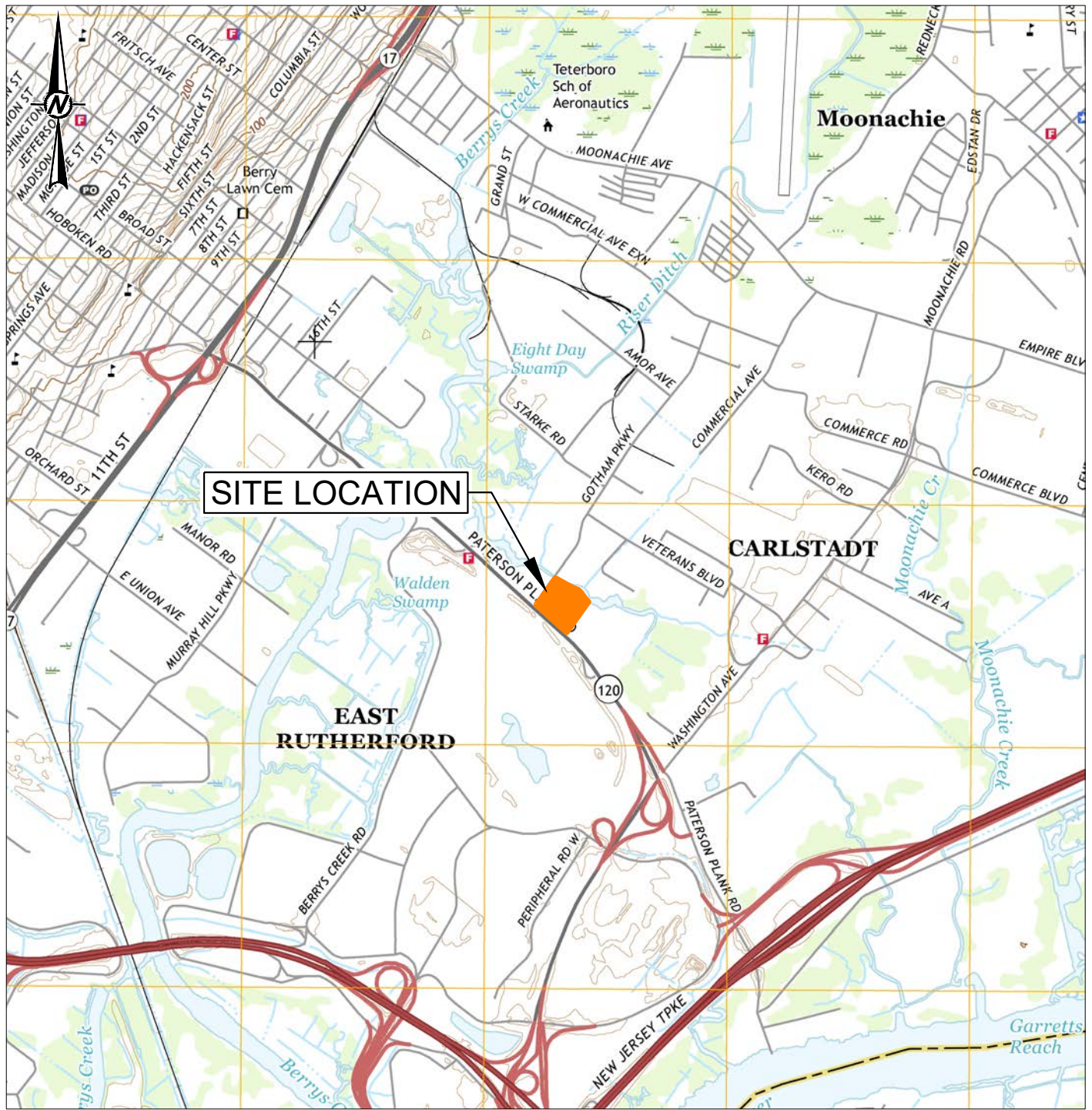
**Total Injection Volume                      2575**

(1) Approximately 4 lbs food-grade citric acid added to tote

**Abbreviations**

psi                      Pounds per Square Inch

Prepared by            ANL  
Checked by             SLS 4/3/2020  
Checked by             DMV 4/15/2020



#### REFERENCE(S)

1. BASE MAP TAKEN FROM U.S.G.S. 7.5 MINUTE QUADRANGLE OF WEEHAWKEN, NEW JERSEY, DATED 2016.

#### CLIENT

216 PATERSON PLANK ROAD PRP GROUP

#### PROJECT

ENHANCED CO-METABOLIC PILOT TEST  
216 PATERSON PLANK ROAD NPL SITE  
CARLSTADT, NEW JERSEY

#### TITLE

**SITE LOCATION MAP**

#### CONSULTANT



YYYY-MM-DD

2020-05-06

DESIGNED

HAL

PREPARED

RG

REVIEWED

HAL

APPROVED

PSF

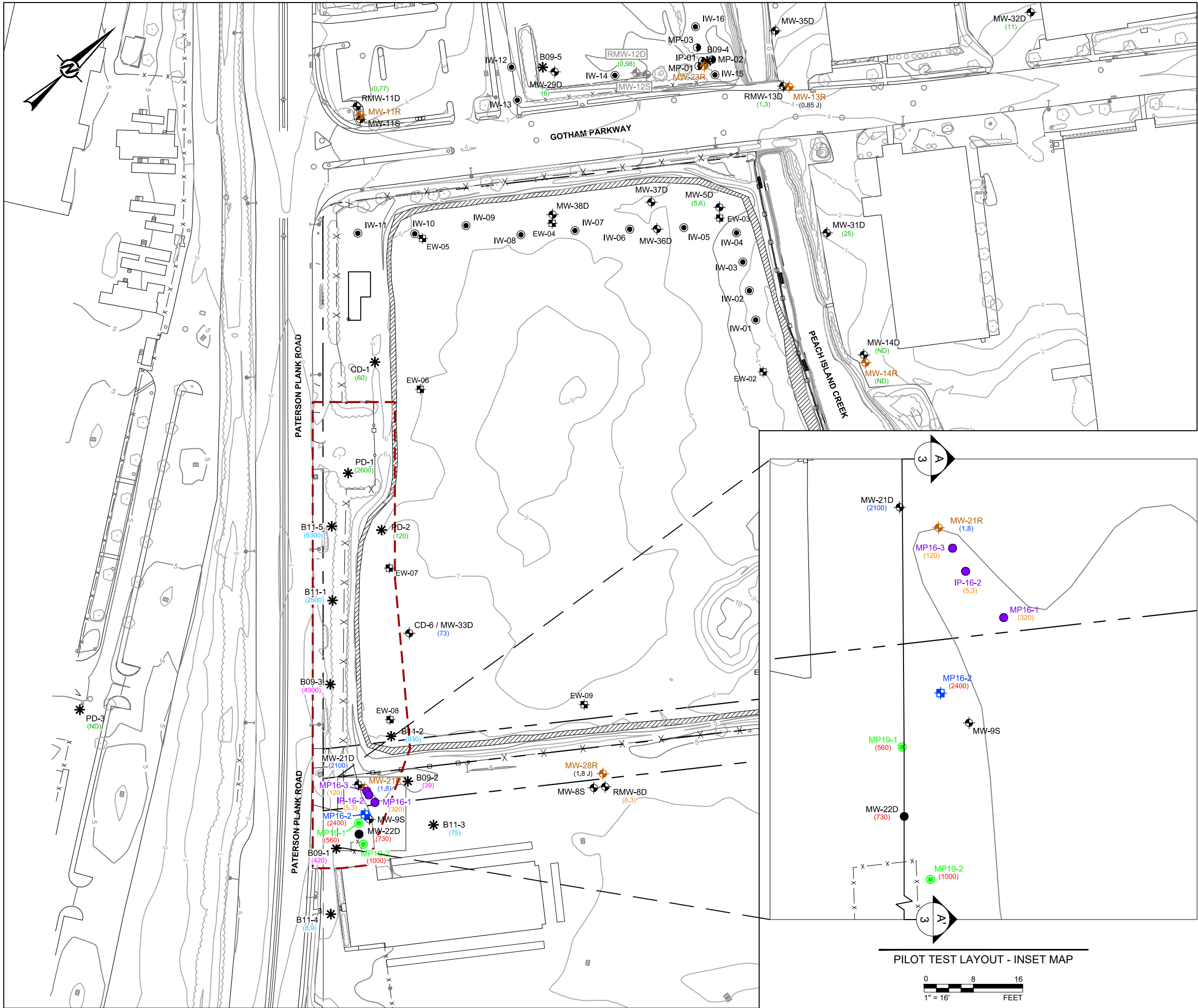
PROJECT NO.  
20141009

CONTROL  
ZZB01

REV.  
0

FIGURE  
1

0 1000 2000  
1" = 2000' FEET



LEGEND

- PROPERTY LINE
- EXISTING GROUND CONTOURS
- EDGE OF STREAM
- EXISTING SLURRY WALL
- TARGET TREATMENT AREA
- MONITORING WELL
- BEDROCK MONITORING WELL
- DECOMMISSIONED WELL
- PROFILE BORING
- OU-2 EXTRACTION WELL (2009)
- EAB PILOT TEST WELL
- ISCO PILOT TEST WELL
- PILOT TEST EXTRACTION WELL
- PILOT TEST MONITORING WELL
- PILOT TEST INJECTION WELL
- PHASE I TILL INJECTION WELL
- 1-4 DIOXANE RESULT (2019 BASELINE)
- 1-4 DIOXANE RESULT (2019)
- 1-4 DIOXANE RESULT (2018)
- 1-4 DIOXANE RESULT (2015)
- 1-4 DIOXANE RESULT (2011)
- 1-4 DIOXANE RESULT (2010)
- 1-4 DIOXANE RESULT (2007)
- 1-4 DIOXANE RESULT (2006)

NOTE(S)

- ALL LOCATIONS ARE APPROXIMATE.
- 1,4-DIOXANE CONCENTRATIONS IN PROFILE BORINGS REPRESENT HIGHEST CONCENTRATION FOUND.

REFERENCE(S)

- BASE MAP SHOWN TAKEN FROM DIGITAL FILE 3074-02-TOPO.DWG, ENTITLED "BOROUGH OF CARLSTADT BLOCK 124 LOTS 1 THROUGH 5," DATED DECEMBER 8, 2005, PREPARED BY PROMAPS.
- HORIZONTAL DATUM REFERENCES THE NEW JERSEY STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM OF 1927 (NAD 27). VERTICAL DATUM REFERENCES THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
- AS-BUILT SHEET PILE, PIEZOMETER, EXTRACTION WELL AND CARRIER PIPE LOCATIONS/LIMITS TAKEN FROM DIGITAL CAD FILE RBSU007938.DWG FIGURE 3 OF 7 ENTITLED "AS-BUILT GROUNDWATER RECOVERY SYSTEM AND PIEZOMETER SURVEY," PREPARED BY MASER CONSULTING P.A., DATED MARCH 9, 2009.
- FENCE AND MAINTENANCE BUILDING LOCATIONS/LIMITS TAKEN FROM DIGITAL CAD FILE RBSU008761.DWG, FIGURE 7 OF 7, ENTITLED "AS-BUILT FINAL SITE CONDITION SURVEY," PREPARED BY MASER CONSULTING P.A., DATED MARCH 17, 2009.
- MONITORING WELLS SURVEYED BY: GEOD CORPORATION (1996, 1998), JAMES M. STEWART, INC. (2002), VARGO ASSOCIATES (2009-2010) AND MPF LAND SURVEYING, LLC (2015, 2017, 2018, 2019).



CLIENT  
216 PATERSON PLANK ROAD PRP GROUP

PROJECT  
ENHANCED CO-METABOLIC PILOT TEST  
216 PATERSON PLANK ROAD NPL SITE  
CARLSTADT, NEW JERSEY

TITLE  
PILOT TEST LAYOUT AND 1,4-DIOXANE DISTRIBUTION

CONSULTANT	YYYY-MM-DD	2020-05-06
DESIGNED	HAL	
PREPARED	RG	
REVIEWED	HAL	
APPROVED	PSF	

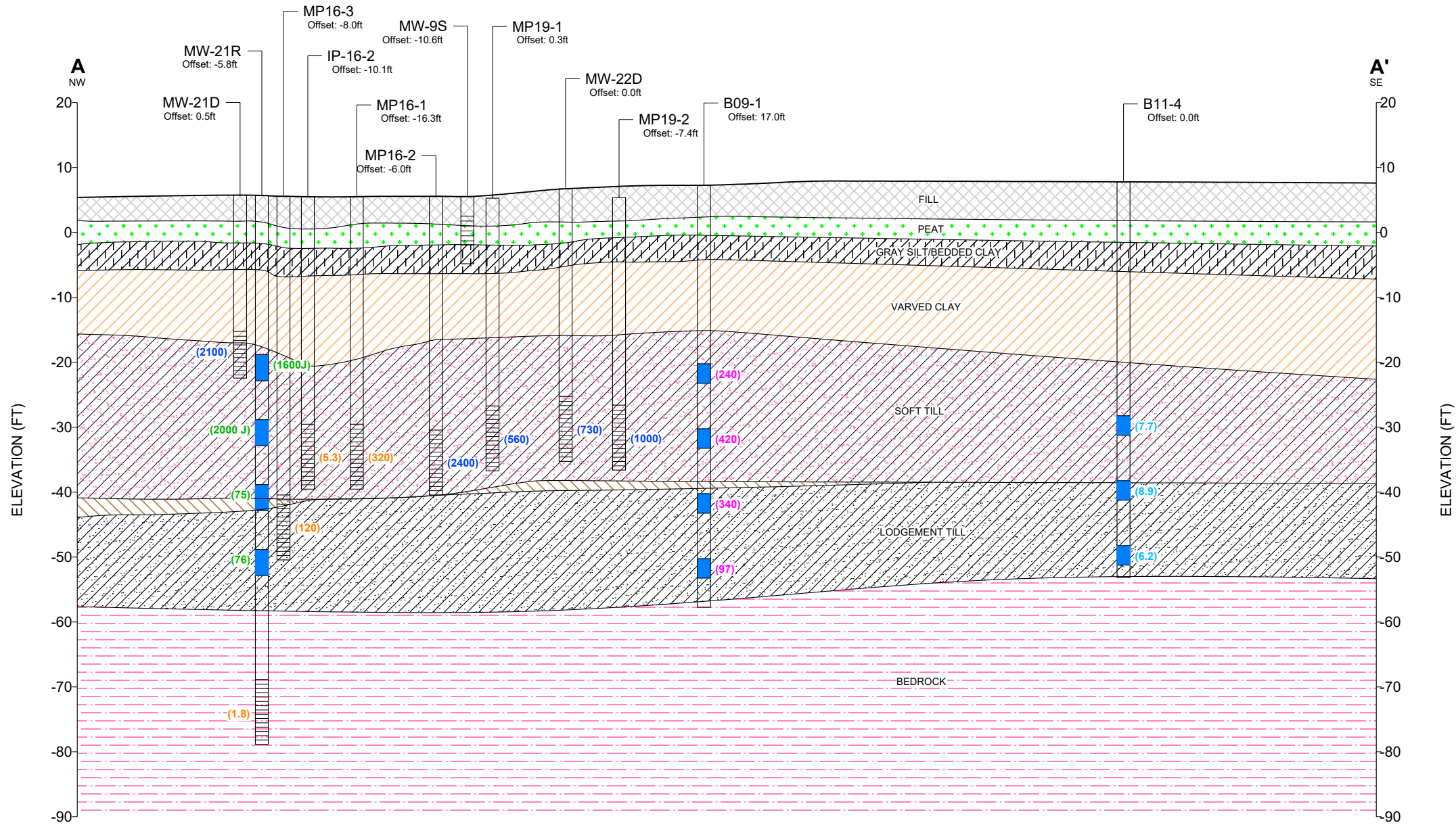


PROJECT NO. 20141009 CONTROL ZZB02 REV. 0 FIGURE 2

PILOT TEST LAYOUT - INSET MAP



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A  
3 CROSS SECTION A-A'

LEGEND

BH-33  
Offset: 17.0ft

BOREHOLE LABEL  
PROJECTED DISTANCE

TOP OF BOREHOLE  
GROUNDWATER SAMPLE INTERVAL (2009-2015)  
SCREENED INTERVAL  
BOTTOM OF BOREHOLE



FILL



PEAT



GRAY SILT / BEDDED CLAY  
(UPPER HORIZON GLACIOLACUSTRINE VARVED CLAY)



VARVED CLAY  
(LOWER HORIZON GLACIOLACUSTRINE VARVED CLAY)



SOFT TILL



LOWER CLAY



LODGE MENT TILL



BEDROCK

(1000) 1-4 DIOXANE RESULT (2019)  
(4300) 1-4 DIOXANE RESULT (2018)  
(4300) 1-4 DIOXANE RESULT (2015)  
(2500) 1-4 DIOXANE RESULT (2011)  
(4300) 1-4 DIOXANE RESULT (2010)

NOTE(S)

1. LOWER CLAY WAS OBSERVED IN CONTINUOUS CORES COLLECTED IN 2009-2010; SPLIT SPOONS WERE TAKEN ON APPROXIMATELY 5 FOOT INTERVALS IN BORINGS COLLECTED IN 2011.
2. 1,4-DIOXANE CONCENTRATIONS IN  $\mu\text{g/L}$ .
3. BASELINE RESULTS SHOWN FOR 2019.

REFERENCE(S)

1. BASE MAP SHOWN TAKEN FROM DIGITAL FILE 3074-02-TOPO.DWG, ENTITLED "BOROUGH OF CARLSTADT BLOCK 124 LOTS 1 THROUGH 5," DATED DECEMBER 8, 2005, PREPARED BY PROMAPS.
2. HORIZONTAL DATUM REFERENCES THE NEW JERSEY STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM OF 1983 (NAD 83). VERTICAL DATUM REFERENCES THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
5. MONITORING WELLS SURVEYED BY: GEOD CORPORATION (1996, 1998), JAMES M. STEWART, INC. (2002), VARGO ASSOCIATES (2009-2010) AND MPF LAND SURVEYING, LLC (2015, 2017, 2018, 2019).



CLIENT

216 PATERSON PLANK ROAD PRP GROUP

PROJECT

ENHANCED CO-METABOLIC PILOT TEST  
216 PATERSON PLANK ROAD NPL SITE  
CARLSTADT, NEW JERSEY

TITLE

GEOLOGIC CROSS SECTION A-A'

CONSULTANT



GOLDER

YYYY-MM-DD	2020-05-06
DESIGNED	HAL
PREPARED	RG
REVIEWED	HAL
APPROVED	PSF

PROJECT NO.  
20141009

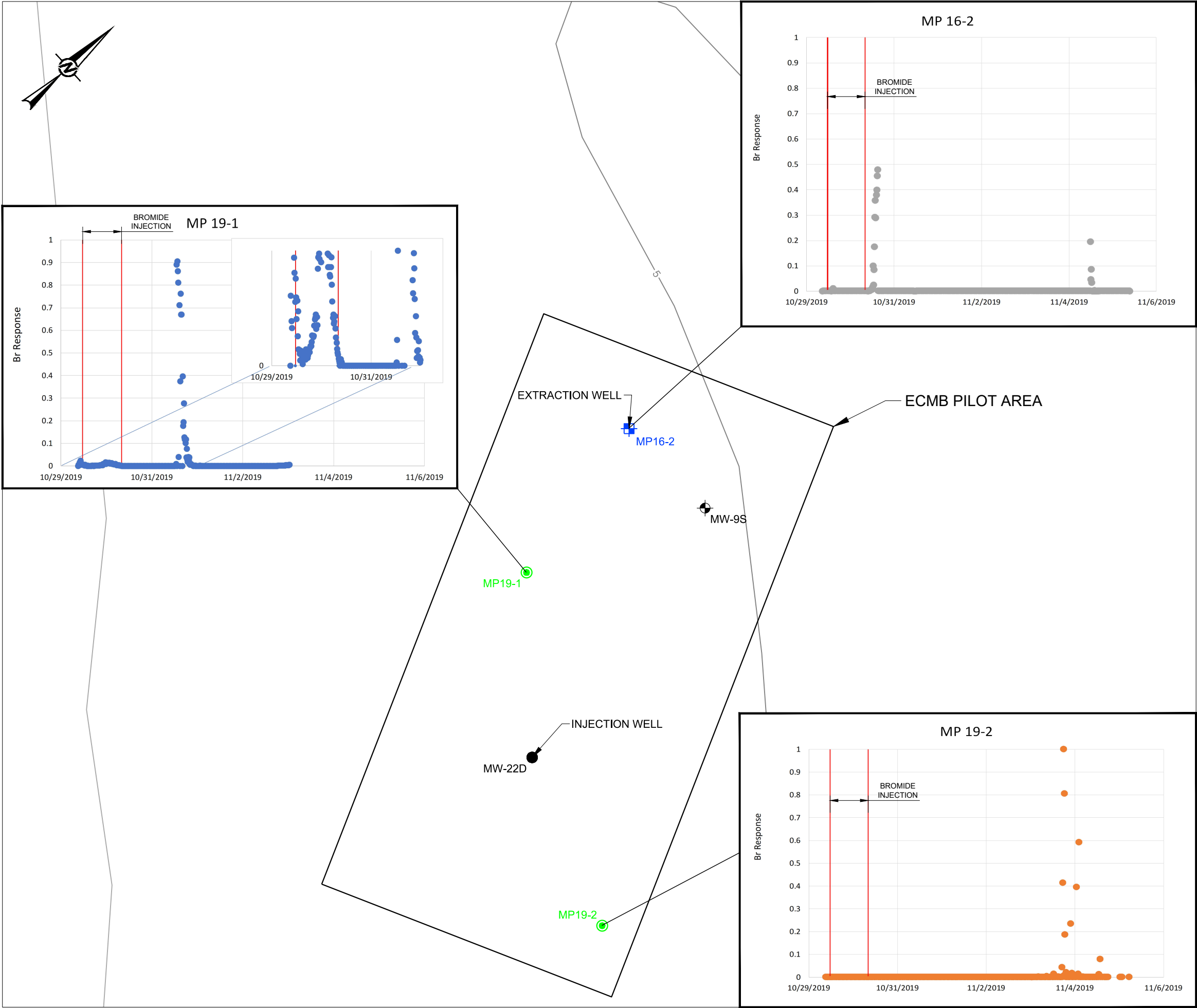
CONTROL  
ZZB03

REV.  
0

FIGURE  
3

1 in IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

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LEGEND

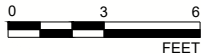
- EXISTING GROUND CONTOURS
- TILL MONITORING WELL
- PILOT TEST EXTRACTION WELL
- PILOT TEST MONITORING WELL
- PILOT TEST INJECTION WELL

NOTE(S)

- BROMIDE RESPONSE NORMALIZED TO MAXIMUM VALUE
- RED VERTICAL LINES INDICATE INJECTIONS

REFERENCE(S)

- BASE MAP SHOWN TAKEN FROM DIGITAL FILE 3074-02-TOPO.DWG, ENTITLED "BOROUGH OF CARLSTADT BLOCK 124 LOTS 1 THROUGH 5," DATED DECEMBER 8, 2005, PREPARED BY PROMAPS.
- HORIZONTAL DATUM REFERENCES THE NEW JERSEY STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM OF 1983 (NAD 1983). VERTICAL DATUM REFERENCES THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
- MONITORING WELLS SURVEYED BY: JAMES M. STEWART, INC. (2002) AND MPF LAND SURVEYING, LLC (2017, 2019).



CLIENT

216 PATERSON PLANK ROAD PRP GROUP

PROJECT

ENHANCED CO-METABOLIC PILOT TEST  
216 PATERSON PLANK ROAD NPL SITE  
CARLSTADT, NEW JERSEY

TITLE

RESPONSE TO BROMIDE INJECTION

CONSULTANT



YYYY-MM-DD 2020-05-06

DESIGNED HAL

PREPARED RG

REVIEWED HAL

APPROVED PSF

PROJECT NO.  
20141009

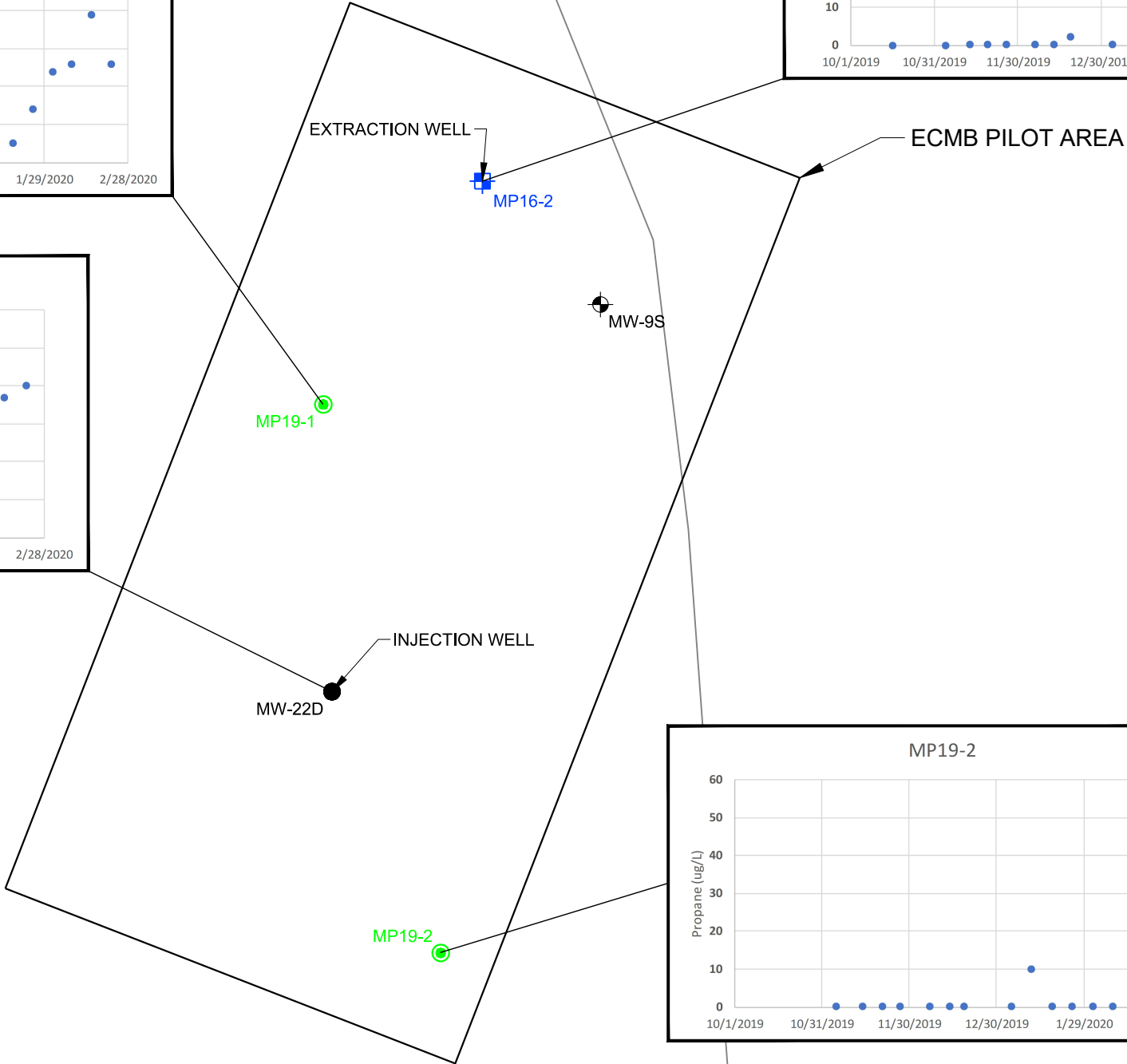
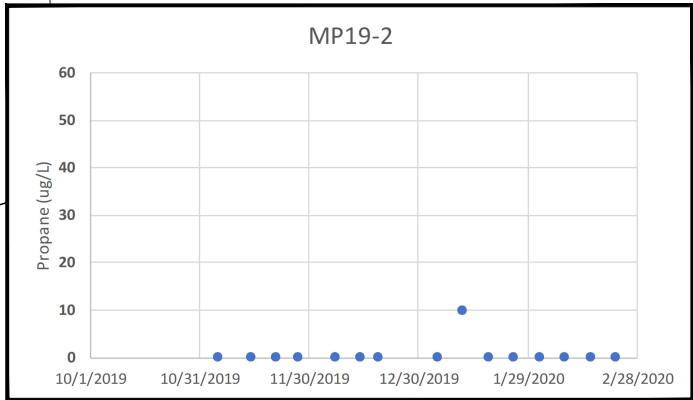
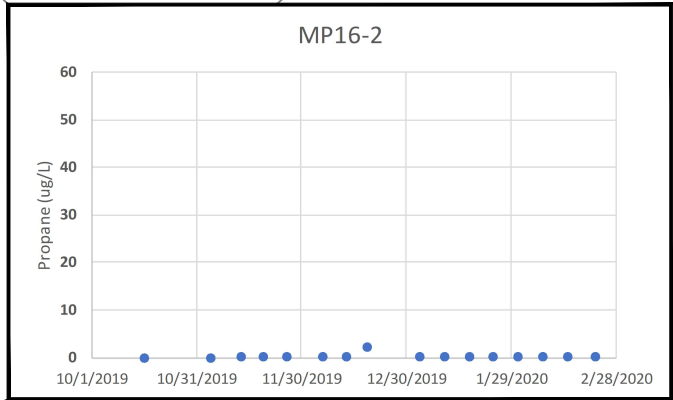
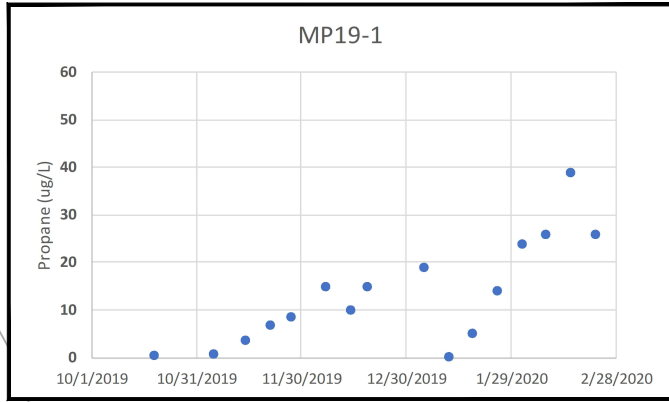
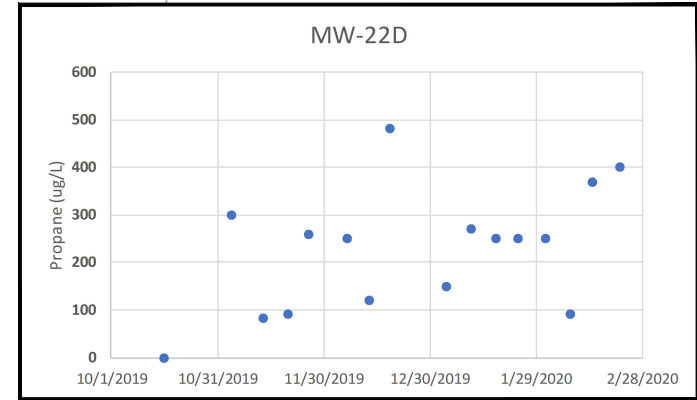
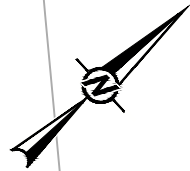
CONTROL  
ZZB04

REV.  
0

FIGURE  
4

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

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**LEGEND**

- 5 ——— EXISTING GROUND CONTOURS
- TILL MONITORING WELL
- PILOT TEST EXTRACTION WELL
- PILOT TEST MONITORING WELL
- PILOT TEST INJECTION WELL

**NOTE**

1. THE VERTICAL SCALE FOR PROPANE CONCENTRATIONS IN MW-22D IS AN ORDER OR MAGNITUDE GREATER THAN THAT SHOWN FOR THE MONITORING WELLS.

- REFERENCE(S)**
1. BASE MAP SHOWN TAKEN FROM DIGITAL FILE 3074-02-TOPO.DWG, ENTITLED "BOROUGH OF CARLSTADT BLOCK 124 LOTS 1 THROUGH 5," DATED DECEMBER 8, 2005, PREPARED BY PROMAPS.
  2. HORIZONTAL DATUM REFERENCES THE NEW JERSEY STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM OF 1983 (NAD 1983). VERTICAL DATUM REFERENCES THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
  3. MONITORING WELLS SURVEYED BY: JAMES M. STEWART, INC. (2002) AND MPF LAND SURVEYING, LLC (2017, 2019).



CLIENT  
216 PATERSON PLANK ROAD PRP GROUP

PROJECT  
ENHANCED CO-METABOLIC PILOT TEST  
216 PATERSON PLANK ROAD NPL SITE  
CARLSTADT, NEW JERSEY

TITLE  
**PROPANE TREND PLOTS**

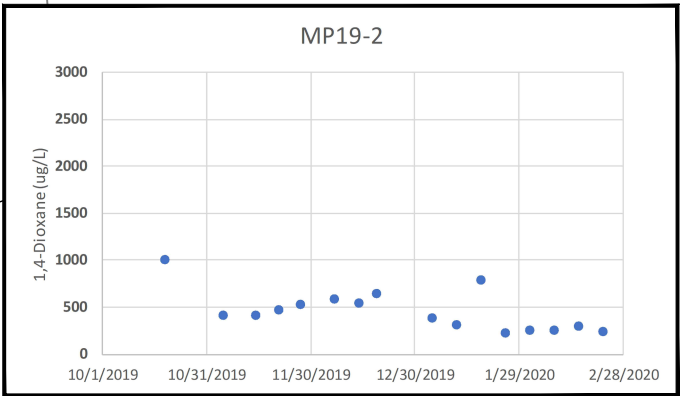
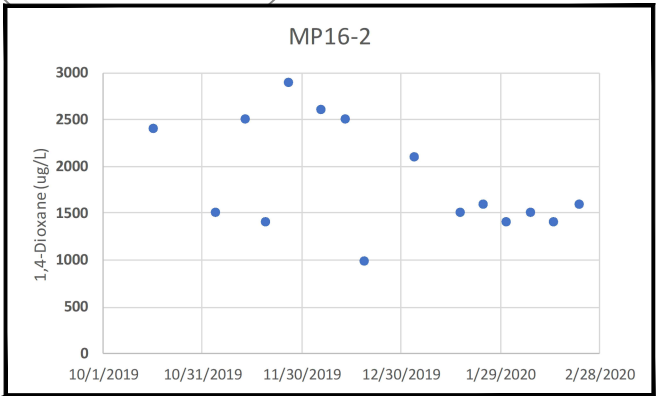
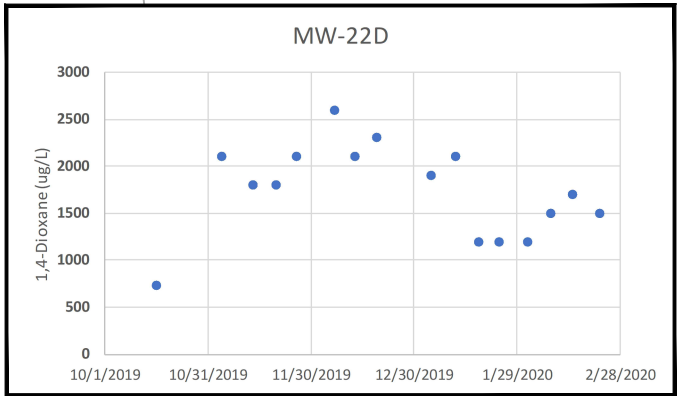
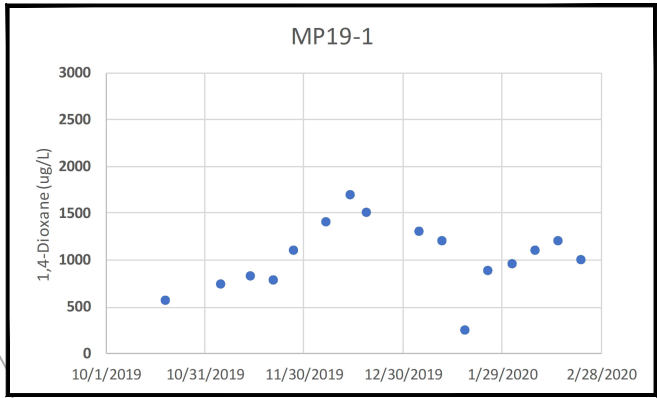
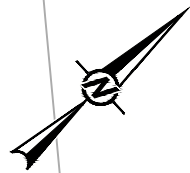
CONSULTANT	YYYY-MM-DD	2020-05-06
	DESIGNED	HAL
	PREPARED	RG
	REVIEWED	HAL
	APPROVED	PSF



PROJECT NO. 20141009	CONTROL ZZB04	REV. 0	FIGURE 5
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1 in IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

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LEGEND

- EXISTING GROUND CONTOURS
- TILL MONITORING WELL
- PILOT TEST EXTRACTION WELL
- PILOT TEST MONITORING WELL
- PILOT TEST INJECTION WELL

REFERENCE(S)

- BASE MAP SHOWN TAKEN FROM DIGITAL FILE 3074-02-TOPO.DWG, ENTITLED "BOROUGH OF CARLSTADT BLOCK 124 LOTS 1 THROUGH 5," DATED DECEMBER 8, 2005, PREPARED BY PROMAPS.
- HORIZONTAL DATUM REFERENCES THE NEW JERSEY STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM OF 1983 (NAD 1983). VERTICAL DATUM REFERENCES THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
- MONITORING WELLS SURVEYED BY: JAMES M. STEWART, INC. (2002) AND MPF LAND SURVEYING, LLC (2017, 2019).



CLIENT  
216 PATERSON PLANK ROAD PRP GROUP

PROJECT  
ENHANCED CO-METABOLIC PILOT TEST  
216 PATERSON PLANK ROAD NPL SITE  
CARLSTADT, NEW JERSEY

TITLE  
1,4-DIOXANE TREND PLOTS

CONSULTANT	YYYY-MM-DD	2020-05-06
	DESIGNED	HAL
	PREPARED	RG
	REVIEWED	HAL
	APPROVED	PSF



PROJECT NO. 20141009 CONTROL ZZB04 REV. 0 FIGURE 6

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

## APPENDIX A

# Well Information (Well Logs, Form As, Form Bs)

**Form A**  
**Monitoring Well Certification – As-Built Certification**

Name of Permittee: Summit Drilling Co., Inc.

Name of Facility: ABF Trucking

Location: 256 Paterson Plank Rd

**CERTIFICATION**

Well permit number (as assigned by NJDEP's Bureau of Water Allocation):	<u>E201908991</u>
Owner's well number (As shown on the application):	<u>MP19-1</u>
Well completion date:	<u>9/16/2019</u>
Distance from top of casing (cap off) to ground surface (one-hundredth of a foot):	<u>0</u>
Total depth of well to the nearest ½ foot:	<u>42</u>
Depth to top of screen from top of casing (one-hundredth of a foot):	<u>32</u>
Screen length (or length of open hole in feet):	<u>10</u>
Screen or slot size:	<u>.010</u>
Screen or slot material:	<u>PVC</u>
Casing material (PVC, Steel or other-specify):	<u>PVC</u>
Casing diameter (inches):	<u>2</u>
Static water level from top of casing at the time of installation (one-hundredth of a foot):	<u>18</u>
Yield (gallons per minute):	<u>1</u>
Development technique (specify):	<u>Pump</u>
Length of time well was developed/pumped or bailed:	<u>1Hour</u>

**Authentication**

I certify under penalty of law that I have personally examined and familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Bo Tyler Crandell  
Driller's Name (type or print)

  
Driller's Signature

754314  
Certification or License No.

Corporate Seal

.....  
Certification by Executive Officer or Duly Authorized Representative

\_\_\_\_\_  
Name (type or print)

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

**Form A**  
**Monitoring Well Certification – As-Built Certification**

Name of Permittee: Summit Drilling Co., Inc.

Name of Facility: ABF Trucking

Location: 256 Paterson Plank Rd

**CERTIFICATION**

Well permit number (as assigned by NJDEP's Bureau of Water Allocation):	<u>E201908992</u>
Owner's well number (As shown on the application):	<u>MP19-2</u>
Well completion date:	<u>9/16/2019</u>
Distance from top of casing (cap off) to ground surface (one-hundredth of a foot):	<u>0</u>
Total depth of well to the nearest ½ foot:	<u>42</u>
Depth to top of screen from top of casing (one-hundredth of a foot):	<u>32</u>
Screen length (or length of open hole in feet):	<u>10</u>
Screen or slot size:	<u>.010</u>
Screen or slot material:	<u>PVC</u>
Casing material (PVC, Steel or other-specify):	<u>PVC</u>
Casing diameter (inches):	<u>2</u>
Static water level from top of casing at the time of installation (one-hundredth of a foot):	<u>18</u>
Yield (gallons per minute):	<u>1</u>
Development technique (specify):	<u>Pump</u>
Length of time well was developed/pumped or bailed:	<u>1Hour</u>

**Authentication**

I certify under penalty of law that I have personally examined and familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Bo Tyler Crandell  
Driller's Name (type or print)

  
Driller's Signature

754314  
Certification or License No.

Corporate Seal

.....  
Certification by Executive Officer or Duly Authorized Representative

\_\_\_\_\_  
Name (type or print)

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

This document has not yet been reviewed and approved or denied by the NJ DEP. Deficiencies in submittal information or actual construction may result in denial.

**WELL RECORD SUBMITTAL PDF**

**PROPERTY OWNER:** N/A CAROLINA FRT CARRIERS/ABF FREIGHT

Organization: CAROLINA FRT CARRIERS/ABF FREIGHT

Address: PO BOX 10048, FORT SMITH, Arizona 72917

**WELL LOCATION:** ABF Trucking

Address: 256 PATERSON PLK RD

County: Bergen Municipality: Carlstadt Boro Lot: 6 Block: 124

Easting(X): 610894 Northing(Y): 724797 Coordinate System: NJ State Plane (NAD83) - USFEET

Method: GPS Point of Reference: Well

GPS Manufacturer: Magellan Surveyor Name: \_\_\_\_\_

GPS Model: CX Surveyor License #: \_\_\_\_\_

Accuracy: 5 Accuracy units: Meters

**WELL USE:** Monitoring **DATE WELL STARTED:** 9/13/2019

**Other Use(s):** \_\_\_\_\_ **DATE WELL COMPLETED:** 9/16/2019

**WELL CONSTRUCTION**

**Permit Number** E201908991 **Total Depth Drilled(ft):** 42 **Drilling Company:** \_\_\_\_\_

**Finished Well Depth(ft):** 42 **Driller Name:** Bo Tyler Crandell

**Local ID:** MP19-1 **Well was finished:** Flush Mount **License No.:** 754314

	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating/Screen Slot # (lbs/sch no.)
Borehole(s)	0	15	10	N/A	N/A
Borehole(s)	15	42	6	N/A	N/A
Casing(s)	0	32	2	PVC	sch 40
Casing(s)	0	15	6	Steel	21lbs
Screen(s)	32	42	2	PVC	.010

	Depth to Top (ft.)	Depth to Bottom (ft.)	Outer Diameter (in)	Inner Diameter (in)	Material		
					Bentonite (lbs.)	Neat Cement (lbs.)	Water (gal.)
Grout	0	29	6	2	2	406	22
Grout	0	15	10	6	2	354	20
Gravel Pack	30	42	6	2	#1 Morie		
Gravel Pack	29	30	6	2	#00 Morie		

Grouting Method: Pressure method (Tremie Pipe)Drilling Method: Sonic

Additional Information: \_\_\_\_\_

Attachments: \_\_\_\_\_

### RECORD OF TEST

Test Date: \_\_\_\_\_ Depth to Pump: \_\_\_\_\_ ft. below land surface  
Pump Capacity: \_\_\_\_\_ gpm  
Static Water Level: 18 ft. below land surface Total Design Head: \_\_\_\_\_ ft.  
Pumping Water Level: \_\_\_\_\_ ft. below land surface Pump Horsepower: \_\_\_\_\_  
Water Level Measure Tool: M Scope If pump tested Discharge Rate: \_\_\_\_\_ gpm  
Pumping Equipment: \_\_\_\_\_ Duration of Test: \_\_\_\_\_ hours  
Well Yield: \_\_\_\_\_ gpm Date Boring Decommissioned: \_\_\_\_\_

### PUMPING EQUIPMENT AND ADDITIONAL INFORMATION

Well Development Period: 1 hours  
Method of Development: \_\_\_\_\_  
Installed: \_\_\_\_\_ Protective Casing: No  
Installer's Name: \_\_\_\_\_ Drilling Fluid: \_\_\_\_\_  
Installer's Registration No.: \_\_\_\_\_ Drill Rig: CRS  
Pump Type: \_\_\_\_\_ Health and Safety Plan: Yes

### GEOLOGIC LOG

Depth to Top	Depth to Bottom	Color	USCS	Additional Description
0	5	Brown	OT - Other	Fill
5	30	Brown	SC - Clayey sands, sand-clay mixtures	
30	42	Brown	GC - Clayey gravels, gravel-sand-clay mixtures	

PENDING  
APPROVAL

This document has not yet been reviewed and approved or denied by the NJ DEP. Deficiencies in submittal information or actual construction may result in denial.

**WELL RECORD SUBMITTAL PDF**

**PROPERTY OWNER:** N/A CAROLINA FRT CARRIERS/ABF FREIGHT  
**Organization:** CAROLINA FRT CARRIERS/ABF FREIGHT  
**Address:** PO BOX 10048, FORT SMITH, Arizona 72917

**WELL LOCATION:** ABF Trucking  
**Address:** 256 PATERSON PLK RD  
**County:** Bergen **Municipality:** Carlstadt Boro **Lot:** 6 **Block:** 124  
**Easting(X):** 610913 **Northing(Y):** 724776 **Coordinate System:** NJ State Plane (NAD83) - USFEET  
**Method:** GPS **Point of Reference:** Well  
**GPS Manufacturer:** Magellan **Surveyor Name:** \_\_\_\_\_  
**GPS Model:** CX **Surveyor License #:** \_\_\_\_\_  
**Accuracy:** 5 **Accuracy units:** Meters

**WELL USE:** Monitoring **DATE WELL STARTED:** 9/13/2019  
**Other Use(s):** \_\_\_\_\_ **DATE WELL COMPLETED:** 9/16/2019

**WELL CONSTRUCTION**

**Permit Number** E201908992 **Total Depth Drilled(ft):** 42 **Drilling Company:** \_\_\_\_\_  
**Local ID:** MP19-2 **Finished Well Depth(ft):** 42 **Driller Name:** Bo Tyler Crandell  
**Well was finished:** Flush Mount **License No.:** 754314

	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating/Screen Slot # (lbs/sch no.)
Borehole(s)	0	15	10	N/A	N/A
Borehole(s)	15	42	6	N/A	N/A
Casing(s)	0	32	2	PVC	sch 40
Casing(s)	0	15	6	Steel	21lb
Screen(s)	32	42	2	PVC	.010

	Depth to Top (ft.)	Depth to Bottom (ft.)	Outer Diameter (in)	Inner Diameter (in)	Material		
					Bentonite (lbs.)	Neat Cement (lbs.)	Water (gal.)
Grout	0	29	6	2	2	406	22
Grout	0	15	10	6	2	354	20
Gravel Pack	30	42	6	2	#1 Morie		
Gravel Pack	29	30	6	2	#00 Morie		

Grouting Method: Pressure method (Tremie Pipe)Drilling Method: Sonic

Additional Information: \_\_\_\_\_

Attachments: \_\_\_\_\_

### RECORD OF TEST

Test Date: \_\_\_\_\_ Depth to Pump: \_\_\_\_\_ ft. below land surface  
Static Water Level: 18 ft. below land surface Pump Capacity: \_\_\_\_\_ gpm  
Pumping Water Level: \_\_\_\_\_ ft. below land surface Total Design Head: \_\_\_\_\_ ft.  
Water Level Measure Tool: M Scope If pump tested Discharge Rate: \_\_\_\_\_ gpm  
Pumping Equipment: \_\_\_\_\_ Duration of Test: \_\_\_\_\_ hours  
Well Yield: \_\_\_\_\_ gpm Date Boring Decommissioned: \_\_\_\_\_

### PUMPING EQUIPMENT AND ADDITIONAL INFORMATION

Well Development Period: 1 hours  
Installed: \_\_\_\_\_ Method of Development: \_\_\_\_\_  
Installer's Name: \_\_\_\_\_ Protective Casing: No  
Installer's Registration No.: \_\_\_\_\_ Drilling Fluid: \_\_\_\_\_  
Pump Type: \_\_\_\_\_ Drill Rig: CRS  
Health and Safety Plan: Yes

### GEOLOGIC LOG

Depth to Top	Depth to Bottom	Color	USCS	Additional Description
0	5	Brown	OT - Other	Fill
5	30	Brown	SC - Clayey sands, sand-clay mixtures	
30	42	Brown	GC - Clayey gravels, gravel-sand-clay mixtures	

PENDING  
APPROVAL



New Jersey Department of Environmental Protection  
Site Remediation Program

Monitoring Well Certification Form B - Location Certification

Date Stamp  
(For Department use only)

SECTION A. SITE NAME AND LOCATION

Site Name: 216 Paterson Plank Road PRP Group

List all AKAs: 216 Paterson Plank Road NPL Site

Street Address: 256 Paterson Plank Road

Municipality: Borough of Carlstadt (Township, Borough or City)

County: Bergen County Zip Code: 07072

Program Interest (PI) Number(s): Case Tracking Number(s):

SECTION B. WELL OWNER AND LOCATION

1. Name of Well Owner N/F Carolina Freight Carriers / ABF Freight

2. Well Location (Street Address) 256 Paterson Plank Road

3. Well Location (Municipal Block and Lot) Block# 124 Lot # 6

SECTION C. WELL LOCATION SPECIFICS

1. Well Permit Number (This number must be permanently affixed to the well casing): E201908991

2. Site Well Number (As shown on application or plans): MP 19-1

3. Geographic Coordinate NAD 83 to nearest 1/100 of a second:

Latitude: North 40°49'20.74" Longitude: West 074°04'14.90"

4. New Jersey State Plane Coordinates NAD 83 datum, US survey feet units, to nearest foot:

North 724,796 East 610,903

5. Elevation of Top of Inner Casing (cap off) at reference mark (nearest 0.01'): 5.31'

Elevation Top of Outer casing: 5.65' Elevation of ground: 5.6'

Check one: ☒ NAVD 88 ☐ NVGD29 ☐ On Site Datum ☒ Other

6. Source of elevation datum (benchmark, number/description and elevation/datum). If an on-site datum is used, identify here, assume datum of 100', and give approximated actual elevation (referencing NAVD 88).

Inner riser elevation of existing onsite monitoring well MP-01 (Permit No. E201100537) per published Form-B certification as provided dated February 28, 2011, prepared by Michael R. Vargo, PLS

7. Significant observations and notes:

\* Elevation of inner casing of existing onsite well MP-01 referenced to NGVD-29 ~ values converted to NAVD-88 via NGS CORPSCON Software (-1.04')

SECTION D. LAND SURVEYOR'S CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

SEAL

Professional Land Surveyor's Signature:

Date 01/24/2020

Surveyor's Name: Michael P. Ferschman, PLS

License Number: NJ 24GS04322100

Firm Name: MPF Land Surveying, LLC

Certificate of Authorization #: 24GA28158300

Mailing Address Montville Office Park ~ 150 River Road, Building D ~ Suite 4B

City/Town: Montville State New Jersey Zip Code: 07045

Phone Number (973)-879-4214 Ext.: Fax:



New Jersey Department of Environmental Protection  
Site Remediation Program

Monitoring Well Certification Form B - Location Certification

Date Stamp  
(For Department use only)

SECTION A. SITE NAME AND LOCATION

Site Name: 216 Paterson Plank Road PRP Group

List all AKAs: 216 Paterson Plank Road NPL Site

Street Address: 256 Paterson Plank Road

Municipality: Borough of Carlstadt (Township, Borough or City)

County: Bergen County Zip Code: 07072

Program Interest (PI) Number(s): Case Tracking Number(s):

SECTION B. WELL OWNER AND LOCATION

1. Name of Well Owner N/F Carolina Freight Carriers / ABF Freight

2. Well Location (Street Address) 256 Paterson Plank Road

3. Well Location (Municipal Block and Lot) Block# 124 Lot # 6

SECTION C. WELL LOCATION SPECIFICS

1. Well Permit Number (This number must be permanently affixed to the well casing): E201908992

2. Site Well Number (As shown on application or plans): MP 19-2

3. Geographic Coordinate NAD 83 to nearest 1/100 of a second:

Latitude: North 40°49'20.63" Longitude: West 074°04'14.65"

4. New Jersey State Plane Coordinates NAD 83 datum, US survey feet units, to nearest foot:

North 724,785 East 610,922

5. Elevation of Top of Inner Casing (cap off) at reference mark (nearest 0.01'): 5.25'

Elevation Top of Outer casing: 5.55' Elevation of ground: 5.5'

Check one: ☒ NAVD 88 ☐ NVGD29 ☐ On Site Datum ☒ Other

6. Source of elevation datum (benchmark, number/description and elevation/datum). If an on-site datum is used, identify here, assume datum of 100', and give approximated actual elevation (referencing NAVD 88).

Inner riser elevation of existing onsite monitoring well MP-01 (Permit No.E201100537) per published Form-B certification as provided dated February 28, 2011, prepared by Michael R. Vargo, PLS

7. Significant observations and notes:

\* Elevation of inner casing of existing onsite well MP-01 referenced to NGVD-29 ~ values converted to NAVD-88 via NGS CORPSCON Software (-1.04')

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Professional Land Surveyor's Signature:

Date 01/24/2020

Surveyor's Name: Michael P. Ferschman, PLS

License Number: NJ 24GS04322100

Firm Name: MPF Land Surveying, LLC

Certificate of Authorization #: 24GA28158300

Mailing Address Montville Office Park ~ 150 River Road, Building D ~ Suite 4B

City/Town: Montville State New Jersey Zip Code: 07045

Phone Number (973)-879-4214

Ext.: Fax:

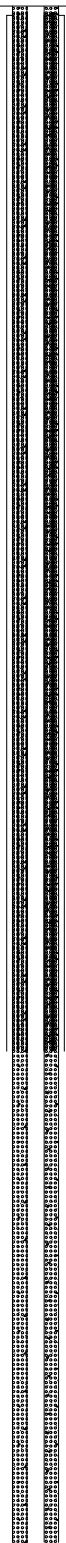
# RECORD OF BOREHOLE MP19-1

PROJECT: Carlstadt OU-3  
PROJECT NUMBER: 943-6222.14  
DRILLED DEPTH: 42.0 ft  
AZIMUTH: N/A  
LOCATION: Carlstadt, NJ

DRILL METHOD: HSA  
DRILL RIG:  
DATE STARTED: 9/5/19  
DATE COMPLETED: 9/16/19  
WEATHER: Cloudy

DATUM: Geodetic  
COORDS: N: 724,796.0 E: 610,903.0  
GS ELEVATION: 5.6 ft  
TOC ELEVATION: 5.3 ft  
TEMPERATURE: 70's

SHEET 1 of 2  
INCLINATION: -90  
DEPTH W.L.:  
ELEVATION W.L.:  
DATE W.L.:  
TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE				SAMPLES						MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	PID (ppm)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC / ATT		
0	5	0.0 - 5.0 SOFT DIG						HAND	N/A		0.0 5.0	<b>MP19-1</b>   0-17 - Permanent - Casing  0-30 -Cement Bentonite - Grout	<b>MP19-1</b> Borehole Diameter: <b>WELL CASING</b> Interval: 0-32 (6 inch steel isolation casing 0-17 ft bgs) Material: PVC Diameter: 2-inch Joint Type: Threaded <b>WELL SCREEN</b> Interval: 32-42 Material: PVC Diameter: 2-inch Slot Size: 0.010 End Cap: Threaded <b>FILTER PACK</b> Interval: 29.5-42 Type: # 1 Sand Quantity: <b>FILTER PACK SEAL</b> Interval: 29-29.5 Type: # 00 Sand Quantity: <b>ANNULUS SEAL</b> Interval: 0-29 Type: Cement Bentonite Grout Quantity:
5	0	5.0 - 15.0 NO RECOVERY			0.6 5.0								
10	-5							HSA	N/A		0.0 10.0		
15	-10	15.0 - 17.0 CL-CLAY, high plasticity; gray brown, laminated, soft, moist, no odor, some staining	CL		-9.4 15.0	0.6	1	HSA	2-2-2-3	4	1.8 2.0		
		17.0 - 22.3 CL-CLAY, brown, firm to soft, moist, no odor, no staining	CL		-11.4 17.0		2	ROTO SONIC	N/A		3.0 3.0		
20	-15												
		22.3 - 27.5 CL-CLAY, trace fine sand; brown, firm to soft, moist, no odor, no staining	CL		-16.7 22.3		3	ROTO SONIC	N/A		5.0 5.0		
25		Log continued on next page											

AA BOREHOLE RECORD CARLSTADT.GPJ GOLDER.NJ-PA 05-24-06.GDT 4/21/20

LOG SCALE: 1 in = 3 ft  
DRILLING COMPANY: Summit Drilling  
DRILLER: G. Anderson

GA INSPECTOR: WPD  
CHECKED BY: EVA  
DATE: 4/9/20



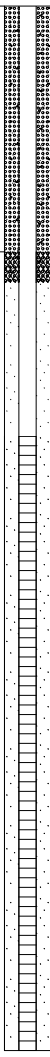
# RECORD OF BOREHOLE MP19-1

PROJECT: Carlstadt OU-3  
PROJECT NUMBER: 943-6222.14  
DRILLED DEPTH: 42.0 ft  
AZIMUTH: N/A  
LOCATION: Carlstadt, NJ

DRILL METHOD: HSA  
DRILL RIG:  
DATE STARTED: 9/5/19  
DATE COMPLETED: 9/16/19  
WEATHER: Cloudy

DATUM: Geodetic  
COORDS: N: 724,796.0 E: 610,903.0  
GS ELEVATION: 5.6 ft  
TOC ELEVATION: 5.3 ft  
TEMPERATURE: 70's

SHEET 2 of 2  
INCLINATION: -90  
DEPTH W.L.:  
ELEVATION W.L.:  
DATE W.L.:  
TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE				SAMPLES						MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	PID (ppm)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC / ATT		
25	-20	22.3 - 27.5 CL-CLAY, trace fine sand; brown, firm to soft, moist, no odor, no staining (Continued)	CL									<b>MP19-1</b>  	<b>MP19-1</b> Borehole Diameter: <b>WELL CASING</b> Interval: 0-32 (6 inch steel isolation casing 0-17 ft bgs) Material: PVC Diameter: 2-inch Joint Type: Threaded <b>WELL SCREEN</b> Interval: 32-42 Material: PVC Diameter: 2-inch Slot Size: 0.010 End Cap: Threaded <b>FILTER PACK</b> Interval: 29.5-42 Type: # 1 Sand Quantity: <b>FILTER PACK SEAL</b> Interval: 29-29.5 Type: # 00 Sand Quantity: <b>ANNULUS SEAL</b> Interval: 0-29 Type: Cement Bentonite Grout Quantity:
		27.5 - 32.3 SC-CLAYEY SAND, fine sand, trace rounded gravel; red, soft to firm, no odor	SC		-21.9 27.5		4	ROTO SONIC	N/A		4.4 5.0		
30	-25	32.3 - 35.0 SP-SAND, fine to coarse, some clay, trace rounded gravel; red brown, black gravel at base	SP		-26.7 32.3		5	ROTO SONIC	N/A		4.8 5.0		
35	-30	35.0 - 42.0 SC-CLAYEY SAND, fine sand to coarse sand, some rounded gravel; red, soft to firm, no odor	SC		-29.4 35.0		6	ROTO SONIC	N/A		4.8 5.0		
40	-35						7	ROTO SONIC	N/A		2.0 2.0		
		Boring completed at 42.0 ft			-36.4								

AA BOREHOLE RECORD CARLSTADT.GPJ GOLDER.NJ-PA 05-24-06.GDT 4/21/20

LOG SCALE: 1 in = 3 ft  
DRILLING COMPANY: Summit Drilling  
DRILLER: G. Anderson

GA INSPECTOR: WPD  
CHECKED BY: EVA  
DATE: 4/9/20



# RECORD OF BOREHOLE MP19-2

PROJECT: Carlstadt OU-3  
PROJECT NUMBER: 943-6222.14  
DRILLED DEPTH: 42.0 ft  
AZIMUTH: N/A  
LOCATION: Carlstadt, NJ

DRILL METHOD: HSA  
DRILL RIG:  
DATE STARTED: 9/5/19  
DATE COMPLETED: 9/16/19  
WEATHER: Cloudy

DATUM: Geodetic  
COORDS: N: 724,785.0 E: 610,922.0  
GS ELEVATION: 5.5 ft  
TOC ELEVATION: 5.3 ft  
TEMPERATURE: 60's

SHEET 1 of 2  
INCLINATION: -90  
DEPTH W.L.:  
ELEVATION W.L.:  
DATE W.L.:  
TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES						MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	PID (ppm)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N			REC / ATT
					DEPTH (ft)								
0	5	0.0 - 0.7 FILL-Asphalt			4.8							MP19-2	MP19-2 Borehole Diameter: WELL CASING Interval: 0-32 (6 inch steel isolation casing 0-17 ft bgs) Material: PVC Diameter: 2-inch Joint Type: Threaded WELL SCREEN Interval: 32-42 Material: PVC Diameter: 2-inch Slot Size: 0.010 End Cap: Threaded FILTER PACK Interval: 29.5-42 Type: #1 Sand Quantity: FILTER PACK SEAL Interval: 29-29.5 Type: # 00 Sand Quantity: ANNULUS SEAL Interval: 0-29 Type: Cement Bentonite Grout Quantity:
		0.7 - 5.0 FILL-GP-SANDY GRAVEL; red brown, compact, moist	GP		0.7	0		HAND	N/A		0.0 5.0		
												0-17 feet - Permanent - Casing	
5	0	5.0 - 9.0 FILL - GP- SANDY GRAVEL; Redish-brown, compact, wet	GP		5.0	0.6	1	HSA	3 -2 -1 -1	2	0.5 2.0		
						1.4	2	HSA	1 -1 -1 -1	2	0.5 2.0		
												0-30 feet-Cement Bentonite Grout	
10	-5	9.0 - 13.0 MH - CLAYEY SILT, low plasticity; grey, olive green, moist, compact, firm, no odor	MH		9.0	0.7	3	HSA	1 -1 -4 -4	8	1.5 2.0		
						0.6	4	HSA	4 -7 -6 -8	14	2.0 2.0		
		13.0 - 15.0 CL-CLAY; grey-brown, laminated, cohesive, moist, no odor	CL		13.0	0.6	5	HSA	6 -4 -3 -4	7	1.0 2.0		
15	-10	15.0 - 20.0 CL-CLAY, trace cobbles, high plasticity; gray-brown, trace laminations, some staining, moist	CL		15.0	0.7	6	HSA	4 -3 -3 -3	6	2.0 2.0		
20	-15	20.0 - 25.0 CL-CLAY, trace fine gravel; brown, soft	CL		20.0	0	8	ROTO SONIC	N/A		1.5 5.0		
25					-19.5								
		Log continued on next page											


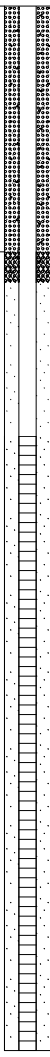
# RECORD OF BOREHOLE MP19-2

PROJECT: Carlstadt OU-3  
PROJECT NUMBER: 943-6222.14  
DRILLED DEPTH: 42.0 ft  
AZIMUTH: N/A  
LOCATION: Carlstadt, NJ

DRILL METHOD: HSA  
DRILL RIG:  
DATE STARTED: 9/5/19  
DATE COMPLETED: 9/16/19  
WEATHER: Cloudy

DATUM: Geodetic  
COORDS: N: 724,785.0 E: 610,922.0  
GS ELEVATION: 5.5 ft  
TOC ELEVATION: 5.3 ft  
TEMPERATURE: 60's

SHEET 2 of 2  
INCLINATION: -90  
DEPTH W.L.:  
ELEVATION W.L.:  
DATE W.L.:  
TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE				SAMPLES						MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	PID (ppm)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC / ATT		
25	-20	25.0 - 28.2 CL-CLAY, trace fine sand, trace red siltstone cobbles; brown, soft, moist, no odor,	CL		25.0	0	9	ROTO SONIC	N/A		<u>5.0</u> 5.0		<b>MP19-2</b>  Borehole Diameter: <b>WELL CASING</b> Interval: 0-32 (6 inch steel isolation casing 0-17 ft bgs) Material: PVC Diameter: 2-inch Joint Type: Threaded <b>WELL SCREEN</b> Interval: 32-42 Material: PVC Diameter: 2-inch Slot Size: 0.010 End Cap: Threaded <b>FILTER PACK</b> Interval: 29.5-42 Type: #1 Sand Quantity: <b>FILTER PACK SEAL</b> Interval: 29-29.5 Type: # 00 Sand Quantity: <b>ANNULUS SEAL</b> Interval: 0-29 Type: Cement Bentonite Grout Quantity:
		28.2 - 29.3 SP-SANDY CLAY, fine sand, some clay, trace gravel; red brown, soft, moist, no odor	SC		-22.7 28.2								
		29.3 - 30.0 CL-CLAY, trace fine sand; red brown, soft, moist	CL		-23.8 29.3								
30	-25	30.0 - 42.0 SC-CLAYEY SAND, fine sand to coarse sand, some rounded gravel; red, soft to firm, no odor	SC		-24.5 30.0								
						0	10	ROTO SONIC	N/A		<u>5.0</u> 5.0	29-29.5 - # 00 Sand	
						0	11	ROTO SONIC	N/A		<u>5.0</u> 5.0	29.5-42 feet - Filter Pack	
						0	12	ROTO SONIC	N/A		<u>24.0</u> 2.0	32-42 feet - 0.010 Slotted - Screen	
		Boring completed at 42.0 ft			-36.5								

AA BOREHOLE RECORD CARLSTADT.GPJ GOLDER.NJ-PA 05-24-06.GDT 4/24/20

LOG SCALE: 1 in = 3 ft  
DRILLING COMPANY: Summit Drilling  
DRILLER: G. Anderson

GA INSPECTOR: WPD  
CHECKED BY: EVA  
DATE: 4/9/20



JOB NAME	Carlstadt		
DEVELOPED BY	W. DeBarba / Summit Drilling		
STARTED DEVEL.	9/18/2019	/	910
	DATE	TIME	
W.L. BEFORE DEVEL.	7.05	9/18/2019	900
	DEPTH	DATE	TIME
WELL DEPTH: BEFORE DEVEL.	41.68		
STANDING WATER COLUMN (FT.)	NM		
SCREEN LENGTH	10 ft.		

JOB NO.	94366222-18	WELL NO.	MP19-1
DATE OF INSTALL.	9/16/2019	SHEET	_____ of _____
COMPLETED DEVEL.	9/18/2019	/	16:15
	DATE	TIME	
W.L. AFTER DEVEL.	Dry/	9/18/2019 /	16:15
	DEPTH	DATE	TIME
AFTER DEVEL.	41.68	WELL DIA. (In.)	2 in.
STANDING WELL VOLUME	NM	gal.	
DRILLING WATER LOSS	NM	gal.	

DATE/TIME		VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS (DTW, Pumping Rate, etc.)			
			SPEC COND (ms/cm)	TEMP. (C)	pH (s.u.)	TURBIDITY (NTU)	DTW MP19-1	DTW MP19-2	DTW MW-22D	GPM
18-Sep	900	0	NM	NM	NM	NM	7.05	1.88	6.22	NM
18-Sep	915	10	3.38	19.45	11.21	296	30.53	2.05	6.22	2
18-Sep	920	20	3.35	19.49	10.6	>1000	Dry	2.16	6.26	2
18-Sep	925	21	3.39	21.63	9.97	>1000	Dry	2.38	6.48	~0.25
18-Sep	935	23	3.58	23.08	9.77	>1000		2.6	6.75	
18-Sep	950	25	3.51	22.01	9.81	>1000		3.11	7.18	
18-Sep	1010	28	3.52	21.86	9.78	>1000		3.55	7.55	
18-Sep	1030	34	3.55	22.67	9.67	903		4.05	7.93	
18-Sep	1110	40	3.57	22.86	9.64	>1000		4.68	8.27	
18-Sep	1140	45	3.71	23.98	9.58	386		5.26	8.53	
18-Sep	1200						Allow to recharge; Begin also purging MP19-2			
18-Sep	1340	46	3.24	20.35	10.21	493				
18-Sep	1500	55	3.78	24.34	9.77	172				
18-Sep	1515	57	3.87	23.99	9.77	150				
18-Sep	1615	65	3.73	25.22	9.66	502				
		65	= TOTAL VOLUME REMOVED (gal.)							

**DEVELOPMENT METHOD:** Overpumping with surging

NOTES:

JOB NAME	Carlstadt	JOB NO.	94366222-18	WELL NO.	MP19-2
DEVELOPED BY	W. DeBarba / Summit Drilling	DATE OF INSTALL.	9/16/2019	SHEET	_____ of _____
STARTED DEVEL.	9/17/2019 / 1200	COMPLETED DEVEL.	9/18/2019 / 16:45		
	DATE TIME		DATE TIME		
W.L. BEFORE DEVEL.	5.26 18-Sep 1150	W.L. AFTER DEVEL.	Dry/ 9/18/2019/ 16:45		
	DEPTH DATE TIME		DEPTH DATE TIME		
WELL DEPTH: BEFORE DEVEL.	42.41	AFTER DEVEL.	42.41	WELL DIA. (1r 2 in.	
STANDING WATER COLUMN (FT.)	NM	STANDING WELL VOLUME	NM	gal.	
SCREEN LENGTH	10 ft.	DRILLING WELL LOSS	NM	gal.	

DATE/TIME		VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS (DTW, Pumping Rate, etc.)
			SPEC COND. (ms/cm)	TEMP. (C)	pH (s.u.)	TURBIDITY (NTU)	
18-Sep	1210	10	1.06	22.74	9.06	>1000	Dry      2 GPM initial
18-Sep	1620	20	3.88	21.29	9.1	>1000	
18-Sep	1630	21	3.94	22.9	8.75	>1000	
18-Sep	1640	21.5	4.06	27	8.6	>1000	
18-Sep	1645	21.75	4.01	27.24	8.55	>1000	
		21.75	= TOTAL VOLUME REMOVED (gal.)				

DEVELOPMENT METHOD: Over-pumping; Well development not completed due to lack of water.

NOTES:

**APPENDIX B**

**Data Usability Summary Report &  
Baseline Results**

## **Carlstadt OU-3 Enhanced Co-Metabolic Bioremediation Pilot Test Report Data Usability Summary Report –Pilot Test Sampling 2019 – 2020**

This report presents the findings of the data quality assessment performed on the analyses of environmental groundwater samples collected in 2019 and 2020 as part of the Enhanced Co-Metabolic Bioremediation Pilot Test (ECMB PT) sampling events at the 216 Paterson Plank Road Site (Site) located in Carlstadt, Bergen County, New Jersey. The chemical data for samples collected at the site were evaluated to identify quality issues which could affect the use of the data for decision making purposes.

A total of sixty-two (62) groundwater samples, as well as fifteen (15) field duplicates, fifteen (15) matrix spike/matrix spike duplicate (MS/MSD) samples, and fifteen (15) field rinsate blanks for quality control (QC) purposes, were collected for chemical analysis during the sampling events. Information regarding the sample point identifications, analytical parameters, QC samples, sampling dates, and contract laboratory sample delivery group (SDG) designations are summarized in Table B-1.

The samples were submitted to Pace Analytical Energy Services, LLC., of Pittsburgh, PA, and TestAmerica Laboratories, Inc. of Edison, New Jersey and Burlington, Vermont. The laboratory analyses were performed as follows:

- 1,4-Dioxane following USEPA Contract Laboratory Program (CLP) Statement of Work (SOW) for Organic Superfund Methods Multi-Media, Multi-Concentration SOM02.4 (October 2016); Semivolatile Organic Compound Analysis (SVOA) - SIM;
- Total Iron following USEPA CLP SOW for Inorganic Superfund Methods Multi-Media, Multi-Concentration ISM02.4 (October 2016);
- Nitrate and Sulfate following USEPA MCAWW Method 300.0 (August 1993);
- Total Organic Carbon (TOC) following Standard Method (SM), 23<sup>rd</sup> Edition 5310B Total Organic Carbon by High-Temperature Combustion (2017);
- Total Alkalinity and Alkalinity as Calcium Carbonate (CaCO<sub>3</sub>) following SM 2320B (2017);
- Ammonia and Phosphate following SM 4500-P and SM 4500-NH<sub>3</sub> (2017); and
- Methane and Propane following Microseeps Analytical Method AM20GAX Standard Operating Procedure (SOP) for the Analysis of Biodegradation Indicator Gases (November 2008).

The data quality assessment was performed in accordance with USEPA Region II Standard Operating Procedure (SOP) HW-35A, Semivolatile Data Validation, Revision 1 (September 2016); and HW-3b, ICP-MS Data Validation, Revision 1 (September 2016). Data review was also performed in accordance with the NJDEP Analytical Laboratory Data Generation, Assessment and Usability Technical Guidance (April 2014)<sup>1</sup>, the ECMP Pilot Test Work Plan (July 2019; Revision 1), the project-specific Quality Assurance Project Plan (QAPP; June 2017) and QAPP Addendum for the ECMB Pilot Test (July 2019; Revision 1), and all laboratory data packages included a Data of Known Quality (DKQP) Conformance/Non-Conformance Summary Questionnaire.

<sup>1</sup> Analytical Laboratory Data Generation, Assessment and Usability Technical Guidance, Version 1.0, NJDEP Site Remediation Program (SRP), April 2014

In general, chemical results for the samples collected at the site were qualified on the basis of outlying precision or accuracy parameters, or on the basis of professional judgment. The following definitions provide a brief explanation of the qualifiers which may have been assigned to data during the data validation process.

<i>J</i>	The analyte is present; however, the reported value may not be accurate or precise.
<i>J-</i>	The analyte is present; however, the reported value may not be accurate or precise, and is likely biased low.
<i>J+</i>	The analyte is present; however, the reported value may not be accurate or precise, and is likely biased high.
<i>U</i>	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
<i>UU</i>	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate.
<i>R</i>	The data is unusable. The sample result is rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

The data generated as part of this sampling event met the QC criteria established in the respective USEPA methods and NJDEP Data Validation SOPs, except as noted below:

- Certain ammonia and propane results were reported at the reporting limit (RL) and qualified as non-detect (U) due to rinsate blank contamination.
- Certain ammonia and phosphate RLs were reported at the sample result and qualified as non-detect (U) due to rinsate blank contamination.
- Certain phosphate results were qualified as estimated (J) due to rinsate blank contamination.
- Certain ammonia and phosphate RLs and results were reported at the rinsate blank result and qualified as non-detect (U) due to rinsate blank contamination.
- Certain 1,4-dioxane and nitrate results were qualified as estimated (J for detected results) because the sample was not properly preserved in the field but were analyzed within holding time.
- Certain iron, 1,4-dioxane, phosphorus, and propane results were qualified as estimated (J) when the relative percent difference (RPD) between the primary and field duplicate sample result was outside QC criteria.
- The 1,4-dioxane result for sample MP19-2 collected on January 24, 2020 was qualified as estimated (J+ for detect results above the RL) when the associated surrogate recovery was above QC criteria.
- The iron and nitrate results for certain samples were qualified as estimated (J) when the associated MS/MSD recovery and/or the relative percent difference (RPD) between the MS and MSD was outside QC criteria.
- Certain nitrate and methane results were qualified as estimated (J+ for detected results, UU for non-detect results) when the associated MS/MSD recoveries were above QC criteria.

- Certain nitrate, phosphorus, sulfate and iron results were qualified as estimated (J- for detected results, UJ for non-detect results) when the associated MS/MSD recoveries were below QC criteria and/or the RPD between the MS and MSD was outside QC criteria.
- The parent sample result for nitrate result was rejected (R) and the other field samples collected on the same day as the parent sample were qualified as estimated (J- for detect results, UJ for non-detect results) when the associated MS/MSD recovery was not successful (i.e. 0% recovery).

Table B-2 summarizes all qualifications applied to the data, with applicable qualifier codes.

Based on the data evaluations and data quality assessment, the analytical data for samples collected at the site were determined to be acceptable (including estimated data) for their intended use with the exception of data that were rejected. Generally acceptable levels of accuracy and precision, based on laboratory control samples, matrix spike/matrix spike duplicates, field duplicate and surrogate recoveries, were achieved for the data. In addition, the data completeness (i.e. the ratio of the amount of valid data obtained to the amount expected) was 99.41%, which exceeds the data quality goal of 90%.

**TABLE B-1**  
**Enhanced Co-Metabolic Pilot Test Report - Carlstadt OU-3**  
**Sample Collection and Analysis Summary**  
**216 Paterson Plank NPL Site**  
**Carlstadt, New Jersey**

SDG	Field Identification	Collection Date	Lab Identification	Matrix	QC Samples	Analysis/Parameters					
						1,4 dioxane by Method SOM02.4 SVOC SIM	Sulfate/Nitrate by EPA 300.0	TOC by SM 5310B	Ammonia/Phosphate by SM 4500-NH3/P	Iron by ISM02.4 ICP-AES	Methane and Propane by AM20GAX
460-195645-1; 32017	FDGW_121819	11/4/2019	460-195645-2; 320170002	GW	Field Dup	X	X	X	X	X	X
460-195645-1; 32017	MP 16-2	11/4/2019	460-195645-3; 320170003	GW	MS/MSD	X	X	X	X	X	X
460-195645-1; 32017	MP 19-1	11/4/2019	460-195645-5; 320170007	GW		X	X	X	X	X	X
460-195645-1; 32017	MP 19-2	11/4/2019	460-195645-6; 320170008	GW		X	X	X	X	X	X
460-195645-1; 32017	MW 22D	11/4/2019	460-195645-1; 320170001	GW		X	X	X	X	X	X
460-195645-1; 32017	RBGW_121819	11/4/2019	460-195645-4; 320170006	WQ	Rinsate Blank	X	X	X	X	X	X
460-196449-1; 32124	FDGW_111319	11/4/2019	460-196449-3; 321240005	GW	Field Dup	X	X	X	X	X	X
460-196449-1; 32124	MP 16-2	11/4/2019	460-196449-1; 321240001	GW	MS/MSD	X	X	X	X	X	X
460-196449-1; 32124	MP 19-1	11/4/2019	460-196449-5; 321240007	GW		X	X	X	X	X	X
460-196449-1; 32124	MP 19-2	11/4/2019	460-196449-6; 321240008	GW		X	X	X	X	X	X
460-196449-1; 32124	MW 22D	11/4/2019	460-196449-2; 321240004	GW		X	X	X	X	X	X
460-196449-1; 32124	RBGW_111319	11/4/2019	460-196449-4; 321240006	WQ	Rinsate Blank	X	X	X	X	X	X
460-197598-1; 32281	FDGW_112619	11/26/2019	460-197598-3; 322810006	GW	Field Dup	X	X	X	X	X	X
460-197598-1; 32281	MP 16-2	11/26/2019	460-197598-2; 322810005	GW		X	X	X	X	X	X
460-197598-1; 32281	MP 19-1	11/26/2019	460-197598-5; 322810007	GW		X	X	X	X	X	X
460-197598-1; 32281	MP 19-2	11/26/2019	460-197598-6; 322810008	GW		X	X	X	X	X	X
460-197598-1; 32281	MW 22D	11/26/2019	460-197598-1; 322810001	GW	MS/MSD	X	X	X	X	X	X
460-197598-1; 32281	RBGW_112619	11/26/2019	460-197598-4; 322810004	WQ	Rinsate Blank	X	X	X	X	X	X
460-198259-1; 32409	FDGW_121819	12/6/2019	460-198259-3; 324090005	GW	Field Dup	X	X	X	X	X	X
460-198259-1; 32409	MP 16-2	12/6/2019	460-198259-1; 324090001	GW	MS/MSD	X	X	X	X	X	X
460-198259-1; 32409	MP 19-1	12/6/2019	460-198259-5; 324090007	GW		X	X	X	X	X	X
460-198259-1; 32409	MP 19-2	12/6/2019	460-198259-6; 324090008	GW		X	X	X	X	X	X
460-198259-1; 32409	MW 22D	12/6/2019	460-198259-2; 324090004	GW		X	X	X	X	X	X
460-198259-1; 32409	RBGW_121819	12/6/2019	460-198259-4; 324090006	WQ	Rinsate Blank	X	X	X	X	X	X
460-198835-1; 32444	FDGW_121319	12/13/2019	460-198835-3; 324440005	GW	Field Dup	X	X	X	X	X	X
460-198835-1; 32444	MP 16-2	12/13/2019	460-198835-1; 324440001	GW	MS/MSD	X	X	X	X	X	X
460-198835-1; 32444	MP 19-1	12/13/2019	460-198835-5; 324440007	GW		X	X	X	X	X	X

Created by: YJS  
Reviewed by: RMS

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**216 Paterson Plank NPL Site**  
**Carlstadt, New Jersey**

SDG	Field Identification	Collection Date	Lab Identification	Matrix	QC Samples	Analysis/Parameters					
						1,4 dioxane by Method SOM02.4 SVOC SIM	Sulfate/Nitrate by EPA 300.0	TOC by SM 5310B	Ammonia/Phosphate by SM 4500-NH3/P	Iron by ISM02.4 ICP-AES	Methane and Propane by AM20GAX
460-198835-1; 32444	MP 19-2	12/13/2019	460-198835-6; 324440008	GW		X	X	X	X	X	X
460-198835-1; 32444	MW 22D	12/13/2019	460-198835-2; 324440004	GW		X	X	X	X	X	X
460-198835-1; 32444	RBGW_121319	12/13/2019	460-198835-4; 324440006	WQ	Rinsate Blank	X	X	X	X	X	X
32494	INJECTATE_121719	12/18/2019	324940009	GW							X
460-196929-1; 32201	FDGW_121819	12/18/2019	460-196929-4; 322010005	GW	Field Dup	X	X	X	X	X	X
460-196929-1; 32201	MP 16-2	12/18/2019	460-196929-1; 322010001	GW	MS/MSD	X	X	X	X	X	X
460-196929-1; 32201	MP 19-1	12/18/2019	460-197119-2; 322010007	GW		X	X	X	X	X	X
460-196929-1; 32201	MP 19-2	12/18/2019	460-197119-1; 322010008	GW		X	X	X	X	X	X
460-196929-1; 32201	MW 22D	12/18/2019	460-196929-3; 322010004	GW		X	X	X	X	X	X
460-196929-1; 32201	RBGW_121819	12/18/2019	460-196929-2; 322010006	WQ	Rinsate Blank	X	X	X	X	X	X
460-199335-1; 32494	FDGW_121819	12/18/2019	460-19935-6; 324940008	GW	Field Dup	X	X	X	X	X	X
460-199335-1; 32494	MP 16-2	12/18/2019	460-19935-1; 324940001	GW	MS/MSD	X	X	X	X	X	X
460-199335-1; 32494	MP 19-1	12/18/2019	460-19935-2; 324940004	GW		X	X	X	X	X	X
460-199335-1; 32494	MP 19-2	12/18/2019	460-19935-3; 324940005	GW		X	X	X	X	X	X
460-199335-1; 32494	MW 22D	12/18/2019	460-19935-4; 324940006	GW		X	X	X	X	X	X
460-199335-1; 32494	RBGW_121819	12/18/2019	460-19935-5; 324940007	WQ	Rinsate Blank	X	X	X	X	X	X
32597	INJECTATE_010220	1/2/2020	325970009	GW							X
460-200042-1; 32597	FDGW_010320	1/3/2020	460-200042-4; 325970004	GW	Field Dup	X	X	X	X	X	X
460-200042-1; 32597	MP 16-2	1/3/2020	460-200042-1; 325970001	GW	MS/MSD	X	X	X	X	X	X
460-200042-1; 32597	MP 19-1	1/3/2020	460-200042-5; 325970005	GW		X	X	X	X	X	X
460-200042-1; 32597	MP 19-2	1/3/2020	460-200042-3; 325970003	GW		X	X	X	X	X	X
460-200042-1; 32597	MW 22D	1/3/2020	460-200042-6; 325970006	GW		X	X	X	X	X	X
460-200042-1; 32597	RBGW_010320	1/3/2020	460-200042-2; 325970002	WQ	Rinsate Blank	X	X	X	X	X	X
460-200532-1; 32648	FDGW_011020	1/10/2020	460-200532-5; 326480007	GW	Field Dup	X	X	X	X	X	X
460-200532-1; 32648	MP 16-2	1/10/2020	460-200532-1; 326480001	GW	MS/MSD	X	X	X	X	X	X
460-200532-1; 32648	MP 19-1	1/10/2020	460-200532-3; 326480004	GW		X	X	X	X	X	X
460-200532-1; 32648	MP 19-2	1/10/2020	460-200532-4; 326480005	GW		X	X	X	X	X	X
460-200532-1; 32648	MW 22D	1/10/2020	460-200532-2; 326480006	GW		X	X	X	X	X	X

Created by: YJS  
Reviewed by: RMS



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**216 Paterson Plank NPL Site**  
**Carlstadt, New Jersey**

SDG	Field Identification	Collection Date	Lab Identification	Matrix	QC Samples	Analysis/Parameters					
						1,4 dioxane by Method SOM02.4 SVOC SIM	Sulfate/Nitrate by EPA 300.0	TOC by SM 5310B	Ammonia/Phosphate by SM 4500-NH3/P	Iron by ISM02.4 ICP-AES	Methane and Propane by AM20GAX
460-200532-1; 32648	RBGW_011020	1/10/2020	460-200532-6; 326480008	WQ	Rinsate Blank	X	X	X	X	X	X
460-201031-1; 32714	FDGW_011720	1/17/2020	460-201031-3; 327140005	GW	Field Dup	X	X	X	X	X	X
460-201031-1; 32714	MP 16-2	1/17/2020	460-201031-1; 327140001	GW	MS/MSD	X	X	X	X	X	X
460-201031-1; 32714	MP 19-1	1/17/2020	460-201031-5; 327140007	GW		X	X	X	X	X	X
460-201031-1; 32714	MP 19-2	1/17/2020	460-201031-6; 327140008	GW		X	X	X	X	X	X
460-201031-1; 32714	MW 22D	1/17/2020	460-201031-2; 327140004	GW		X	X	X	X	X	X
460-201031-1; 32714	RBGW_011720	1/17/2020	460-201031-4; 327140006	WQ	Rinsate Blank	X	X	X	X	X	X
460-201582-1; 32791	FDGW_121819	1/24/2020	460-201582-3; 327910005	GW	Field Dup	X	X	X	X	X	X
460-201582-1; 32791	MP 16-2	1/24/2020	460-201582-1; 327910001	GW	MS/MSD	X	X	X	X	X	X
460-201582-1; 32791	MP 19-1	1/24/2020	460-201582-4; 327910007	GW		X	X	X	X	X	X
460-201582-1; 32791	MP 19-2	1/24/2020	460-201582-5; 327910008	GW		X	X	X	X	X	X
460-201582-1; 32791	MW 22D	1/24/2020	460-201582-2; 327910004	GW		X	X	X	X	X	X
460-201582-1; 32791	RBGW_121819	1/24/2020	460-201582-6; 327910006	WQ	Rinsate Blank	X	X	X	X	X	X
460-202083-1;32867	FDGW_013120	1/31/2020	460-202083-3; 328670005	GW	Field Dup	X	X	X	X	X	X
460-202083-1;32867	MP 16-2	1/31/2020	460-202083-1; 328670001	GW	MS/MSD	X	X	X	X	X	X
460-202083-1;32867	MP 19-1	1/31/2020	460-202083-4; 328670006	GW		X	X	X	X	X	X
460-202083-1;32867	MP 19-2	1/31/2020	460-202083-5; 328670007	GW		X	X	X	X	X	X
460-202083-1;32867	MW 22D	1/31/2020	460-202083-2; 328670004	GW		X	X	X	X	X	X
460-202083-1;32867	RBGW_013120	1/31/2020	460-202083-6; 328670008	WQ	Rinsate Blank	X	X	X	X	X	X
460-202537-1; 32932	FDGW_020720	2/7/2020	460-202537-6; 329320005	GW	Field Dup	X	X	X	X	X	X
460-202537-1; 32932	MP 16-2	2/7/2020	460-202537-1; 329320001	GW	MS/MSD	X	X	X	X	X	X
460-202537-1; 32932	MP 19-1	2/7/2020	460-202537-4; 329320006	GW		X	X	X	X	X	X
460-202537-1; 32932	MP 19-2	2/7/2020	460-202537-5; 329320007	GW		X	X	X	X	X	X
460-202537-1; 32932	MW 22D	2/7/2020	460-202537-3; 329320004	GW		X	X	X	X	X	X
460-202537-1; 32932	RBGW_020720	2/7/2020	460-202537-2; 329320008	WQ	Rinsate Blank	X	X	X	X	X	X
460-203165-1; 32998	FDGW_021420	2/14/2020	460-203165-3; 329980005	GW	Field Dup	X	X	X	X	X	X
460-203165-1; 32998	MP 16-2	2/14/2020	460-203165-1; 329980001	GW	MS/MSD	X	X	X	X	X	X
460-203165-1; 32998	MP 19-1	2/14/2020	460-203165-4; 329980006	GW		X	X	X	X	X	X

Created by: YJS  
Reviewed by: RMS

**TABLE B-1**  
**Enhanced Co-Metabolic Pilot Test Report - Carlstadt OU-3**  
**Sample Collection and Analysis Summary**  
**216 Paterson Plank NPL Site**  
**Carlstadt, New Jersey**

SDG	Field Identification	Collection Date	Lab Identification	Matrix	QC Samples	Analysis/Parameters					
						1,4 dioxane by Method SOM02.4 SVOC SIM	Sulfate/Nitrate by EPA 300.0	TOC by SM 5310B	Ammonia/Phosphate by SM 4500-NH3/P	Iron by ISM02.4 ICP-AES	Methane and Propane by AM20GAX
460-203165-1; 32998	MP 19-2	2/14/2020	460-203165-5; 329980007	GW		X	X	X	X	X	X
460-203165-1; 32998	MW 22D	2/14/2020	460-203165-2; 329980004	GW		X	X	X	X	X	X
460-203165-1; 32998	RBGW_021420	2/14/2020	460-203165-6; 329980008	WQ	Rinsate Blank	X	X	X	X	X	X
460-203523-1; 33049	FDGW_022120	2/21/2020	460-203523-3; 330490003	GW	Field Dup	X	X	X	X	X	X
460-203523-1; 33049	MP 16-2	2/21/2020	460-203523-1; 330490001	GW	MS/MSD	X	X	X	X	X	X
460-203523-1; 33049	MP 19-1	2/21/2020	460-203523-4; 330490004	GW		X	X	X	X	X	X
460-203523-1; 33049	MP 19-2	2/21/2020	460-203523-5; 330490005	GW		X	X	X	X	X	X
460-203523-1; 33049	MW 22D	2/21/2020	460-203523-2; 330490002	GW		X	X	X	X	X	X
460-203523-1; 33049	RBGW_022120	2/21/2020	460-203523-6; 330490006	WQ	Rinsate Blank	X	X	X	X	X	X

**Notes:**

All analyses performed by TestAmerica and Pace Analytical.

**Abbreviations:**

Field Dup - Field Duplicate

ECMB - Enhanced Co-Metabolic Bioremediation

GW - Groundwater

MS/MSD - Matrix Spike / Matrix Spike Duplicate

OU - Operable Unit

QC - Quality Control

RB - Rinsate Blank

SDG - Sample Delivery Group

TB - Trip Blank

TOC - Total Organic Carbon

VOCs - Volatile Organic Compounds

WQ - Water Quality

**TABLE B-2**  
**Enhanced Co-Metabolic Pilot Test Report - Carlstadt OU-3**  
**Qualifier Summary Table**  
**216 Paterson Plank NPL Site**  
**Carlstadt, New Jersey**

<b>SDG</b>	<b>Sample Name</b>	<b>Constituent</b>	<b>New Result</b>	<b>New RL</b>	<b>New MDL</b>	<b>Qualifier</b>	<b>Reason</b>
32017	MP 16-2	Propane	0.1	0.1	-	U	Rinsate blank contamination below the RL
32124	MP 16-2	Methane	-	-	-	J+	MS/MSD recoveries above QC criteria
32124	MP 22-D	Methane	-	-	-	J+	MS/MSD recoveries above QC criteria
32124	MP 19-2	Methane	-	-	-	J+	MS/MSD recoveries above QC criteria
32124	MP 12-1	Methane	-	-	-	J+	MS/MSD recoveries above QC criteria
32124	FDGW_111319	Methane	-	-	-	J+	MS/MSD recoveries above QC criteria
32201	MW-22D	Propane	-	-	-	J	Field duplicate and parent sample RPD outside of QC criteria
32201	FDGW_111919	Propane	-	-	-	J	Field duplicate and parent sample RPD outside of QC criteria
32201	MW-22D	Methane	-	-	-	J	Field duplicate and parent sample RPD outside of QC criteria
32444	MP 16-2	Methane	-	-	-	J+	MS/MSD recovery above QC criteria
32444	MP 22-D	Methane	-	-	-	J+	MS/MSD recovery above QC criteria
32444	FDGW_121319	Methane	-	-	-	J+	MS/MSD recovery above QC criteria
32444	MP 19-1	Methane	-	-	-	J+	MS/MSD recovery above QC criteria
32444	MP 19-2	Methane	-	-	-	J+	MS/MSD recovery above QC criteria
32867	MP 16-2	Methane	-	-	-	J+	MS/MSD recoveries above QC criteria
32867	MP 19-1	Methane	-	-	-	J+	MS/MSD recoveries above QC criteria
32867	MP 19-2	Methane	-	-	-	J+	MS/MSD recoveries above QC criteria
32867	MW-22D	Methane	-	-	-	J+	MS/MSD recoveries above QC criteria
32867	FDGW_013120	Methane	-	-	-	J+	MS/MSD recoveries above QC criteria
460-195645	MP 16-2	Nitrate as N	-	-	-	R	MS/MSD recoveries and RPD outside of QC criteria.
460-195645	MP 16-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-195645	MP 19-1	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-195645	MP 16-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-195645	MP 19-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-195645	MP 22-D	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-195645	FDGW_110419	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-195645	MP 19-2	Nitrate as N	-	-	-	J-	MS/MSD recoveries below QC criteria
460-195645	MP 19-1	Nitrate as N	-	-	-	UJ	MS/MSD recoveries below QC criteria
460-195645	MP 16-2	Nitrate as N	-	-	-	UJ	MS/MSD recoveries below QC criteria
460-195645	MP 22-D	Nitrate as N	-	-	-	UJ	MS/MSD recoveries below QC criteria
460-195645	FDGW_110419	Nitrate as N	-	-	-	UJ	MS/MSD recoveries below QC criteria
460-196449	MP 19-2	Nitrate as N	-	-	-	J+	MS/MSD recoveries above QC criteria
460-196449	MP 19-1	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-196449	MP 16-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-196449	MP 19-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-196449	MP 22-D	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-196449	FDGW_111319	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-196449	MP 19-1	Phosphorus as P	-	-	-	J	Contamination in rinsate blank above the RL
460-196449	MP 16-2	Phosphorus as P	-	-	-	J	Contamination in rinsate blank above the RL
460-196449	MP 19-2	Phosphorus as P	-	-	-	J	Contamination in rinsate blank above the RL

Created by: YJS  
Reviewed by: RMS



**TABLE B-2**  
**Enhanced Co-Metabolic Pilot Test Report - Carlstadt OU-3**  
**Qualifier Summary Table**  
**216 Paterson Plank NPL Site**  
**Carlstadt, New Jersey**

<b>SDG</b>	<b>Sample Name</b>	<b>Constituent</b>	<b>New Result</b>	<b>New RL</b>	<b>New MDL</b>	<b>Qualifier</b>	<b>Reason</b>
460-196449	MP 22-D	Phosphorus as P	-	-	-	J	Contamination in rinsate blank above the RL
460-196449	MP 22-D	1,4 dioxane	-	-	-	J	FD RPD outside of QC criteria
460-196449	FDGW_111319	1,4 dioxane	-	-	-	J	FD RPD outside of QC criteria
460-196449	FDGW_111319	Phosphorus as P	-	-	-	J	Contamination in rinsate blank above the RL
460-196929	MP 19-2	Nitrate as N	-	-	-	J-	MS/MSD recoveries and RPD outside of QC criteria.
460-196929	MP 16-2	Nitrate as N	-	-	-	R	MS/MSD recoveries and RPD outside of QC criteria.
460-196929	MP 19-1	Nitrate as N	-	-	-	UJ	MS/MSD recoveries and RPD outside of QC criteria.
460-196929	MW-22D	Nitrate as N	-	-	-	UJ	MS/MSD recoveries and RPD outside of QC criteria.
460-196929	FDGW_121819	Nitrate as N	-	-	-	UJ	MS/MSD recoveries and RPD outside of QC criteria.
460-196929	MP 16-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-196929	MP 19-1	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-196929	MP 19-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-196929	MW-22D	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-196929	FDGW_121819	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-196929	MP 16-2	Phosphorus as P	-	-	-	J	Contamination in rinsate blank above the RL
460-196929	MP 19-1	Phosphorus as P	-	-	-	J	Contamination in rinsate blank above the RL
460-196929	MP 19-2	Phosphorus as P	-	-	-	J	Contamination in rinsate blank above the RL
460-196929	MW-22D	Phosphorus as P	-	-	-	J	Contamination in rinsate blank above the RL
460-196929	FDGW_121819	Phosphorus as P	-	-	-	J	Contamination in rinsate blank above the RL
460-197598	MP 19-2	Nitrate as N	-	-	-	J+	MS/MSD recoveries above QC criteria
460-197598	MP 16-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-197598	MP 19-1	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-197598	MP 19-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-197598	MW-22D	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-197598	FDGW_112619	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-197598	MP 16-2	Phosphorus as P	-	-	-	J	Contamination in rinsate blank above the RL
460-197598	MP 19-1	Phosphorus as P	-	-	-	J	Contamination in rinsate blank above the RL
460-197598	MP 19-2	Phosphorus as P	-	-	-	J	Contamination in rinsate blank above the RL
460-197598	MW-22D	Phosphorus as P	-	-	-	J	Contamination in rinsate blank above the RL
460-197598	FDGW_112619	Phosphorus as P	-	-	-	J	Contamination in rinsate blank above the RL
460-197598	MP 16-2	Iron	-	-	-	J	MS/MSD recoveries outside QC criteria
460-197598	MP 19-1	Iron	-	-	-	J	MS/MSD recoveries outside QC criteria
460-197598	MP 19-2	Iron	-	-	-	J	MS/MSD recoveries outside QC criteria
460-197598	MW-22D	Iron	-	-	-	J	MS/MSD recoveries outside QC criteria
460-197598	FDGW_112619	Iron	-	-	-	J	MS/MSD recoveries outside QC criteria
460-198259	MP 19-2	Phosphorus as P	0.03	0.03	0.03	UJ	Contamination in the rinsate blank between RL and MDL. MS/MSD recoveries below QC criteria
460-198259	MP 19-1	Phosphorus as P	0.32	0.32	0.32	UJ	Contamination in the rinsate blank between RL and MDL. MS/MSD recoveries below QC criteria
460-198259	MP 19-2	Nitrate as N	-	-	-	J+	MS/MSD recoveries above QC criteria

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Reviewed by: RMS



**TABLE B-2**  
**Enhanced Co-Metabolic Pilot Test Report - Carlstadt OU-3**  
**Qualifier Summary Table**  
**216 Paterson Plank NPL Site**  
**Carlstadt, New Jersey**

<i>SDG</i>	<i>Sample Name</i>	<i>Constituent</i>	<i>New Result</i>	<i>New RL</i>	<i>New MDL</i>	<i>Qualifier</i>	<i>Reason</i>
460-198259	MP 16-2	Phosphorus as P	-	-	-	J-	MS/MSD recoveries below QC criteria
460-198259	MP 22-D	Phosphorus as P	-	-	-	J-	MS/MSD recoveries below QC criteria
460-198259	FDGW_121819	Phosphorus as P	-	-	-	J-	MS/MSD recoveries below QC criteria
460-198259	MP 19-1	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-198259	MP 16-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-198259	MP 19-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-198259	MP 22-D	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-198259	FDGW_121819	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-198835	MP 19-1	Phosphorus as P	-	-	-	J+	MS/MSD recoveries above QC criteria. Contamination in rinsate blank above RL
460-198835	MP 16-2	Phosphorus as P	-	-	-	J+	MS/MSD recoveries above QC criteria. Contamination in rinsate blank above RL
460-198835	MP 22-D	Phosphorus as P	-	-	-	J+	MS/MSD recoveries above QC criteria. Contamination in rinsate blank above RL
460-198835	FDGW_121319	Phosphorus as P	-	-	-	J+	MS/MSD recoveries above QC criteria. Contamination in rinsate blank above RL
460-198835	MP 19-1	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-198835	MP 16-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-198835	MP 19-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-198835	MP 22-D	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-198835	FDGW_121319	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-198835	MP 19-2	Nitrate as N	-	-	-	J-	MS/MSD recoveries below QC criteria
460-198835	MP 19-1	Nitrate as N	-	-	-	UJ	MS/MSD recoveries below QC criteria
460-198835	MP 16-2	Nitrate as N	-	-	-	UJ	MS/MSD recoveries below QC criteria
460-198835	MP 22-D	Nitrate as N	-	-	-	UJ	MS/MSD recoveries below QC criteria
460-198835	FDGW_121319	Nitrate as N	-	-	-	UJ	MS/MSD recoveries below QC criteria
460-199335	MP 16-2	Nitrate as N	-	-	-	J	MS/MSD recoveries and RPD outside of QC criteria.
460-199335	MP 19-2	Nitrate as N	-	-	-	J	MS/MSD recoveries and RPD outside of QC criteria.
460-199335	FDGW_121819	Nitrate as N	-	-	-	UJ	MS/MSD recoveries and RPD outside of QC criteria.
460-199335	MP 19-1	Nitrate as N	-	-	-	UJ	MS/MSD recoveries and RPD outside of QC criteria.
460-199335	MW-22D	Nitrate as N	-	-	-	UJ	MS/MSD recoveries and RPD outside of QC criteria.
460-199335	MP 16-2	Phosphorus as P	0.99	0.99	0.99	U	Contamination in the rinsate blank
460-199335	MP 19-1	Phosphorus as P	0.99	0.99	0.99	U	Contamination in the rinsate blank
460-199335	MP 19-2	Phosphorus as P	0.99	0.99	0.99	U	Contamination in the rinsate blank
460-199335	FDGW_121819	Phosphorus as P	0.99	0.99	0.99	U	Contamination in the rinsate blank
460-199335	MW-22D	Phosphorus as P	0.99	0.99	0.99	U	Contamination in the rinsate blank
460-199335	MP 19-1	1,4 dioxane	-	-	-	J	Sample extracted outside of holding time.
460-199335	FDGW_121819	Iron	-	-	-	J	FD RPD outside of QC criteria
460-199335	MW-22D	Iron	-	-	-	J	FD RPD outside of QC criteria
460-199335	FDGW_121819	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-199335	MP 16-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-199335	MP 19-1	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-199335	MP 19-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-199335	MW-22D	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-200042	MP 16-2	1,4 dioxane	-	-	-	J	FD RPD outside of QC criteria

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**TABLE B-2**  
**Enhanced Co-Metabolic Pilot Test Report - Carlstadt OU-3**  
**Qualifier Summary Table**  
**216 Paterson Plank NPL Site**  
**Carlstadt, New Jersey**

SDG	Sample Name	Constituent	New Result	New RL	New MDL	Qualifier	Reason
460-200042	FDGW_010320	1,4 dioxane	-	-	-	J	FD RPD outside of QC criteria
460-200042	MP 16-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-200042	MP 19-1	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-200042	MP 19-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-200042	MW-22D	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-200042	FDGW_010320	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-200042	MP 16-2	Nitrate as N	-	-	-	UJ	Sample analyzed outside of hold time. MS/MSD recoveries outside of QC criteria.
460-200042	MP 19-1	Nitrate as N	-	-	-	UJ	Sample analyzed outside of hold time. MS/MSD recoveries outside of QC criteria.
460-200042	MP 19-2	Nitrate as N	-	-	-	UJ	Sample analyzed outside of hold time. MS/MSD recoveries outside of QC criteria.
460-200042	MW-22D	Nitrate as N	-	-	-	UJ	Sample analyzed outside of hold time. MS/MSD recoveries outside of QC criteria.
460-200042	FDGW_010320	Nitrate as N	-	-	-	UJ	Sample analyzed outside of hold time. MS/MSD recoveries outside of QC criteria.
460-200532	MP 19-2	Phosphorus as P	0.03	0.03	0.03	UJ	Contamination in the rinsate blank. MS/MSD recoveries below QC criteria.
460-200532	MP 16-2	Phosphorus as P	-	0.45	0.45	UJ	Contamination in the rinsate blank. MS/MSD recoveries below QC criteria.
460-200532	MP 19-1	Phosphorus as P	-	0.21	0.21	UJ	Contamination in the rinsate blank. MS/MSD recoveries below QC criteria.
460-200532	MW-22D	Phosphorus as P	-	0.47	0.47	UJ	Contamination in the rinsate blank. MS/MSD recoveries below QC criteria.
460-200532	FDGW_011020	Phosphorus as P	-	0.47	0.47	UJ	Contamination in the rinsate blank. MS/MSD recoveries below QC criteria.
460-200532	MP 16-2	Nitrate as N	-	-	-	UJ	MS/MSD recoveries above QC criteria
460-200532	MP 19-1	Nitrate as N	-	-	-	UJ	MS/MSD recoveries above QC criteria
460-200532	MP 19-2	Nitrate as N	-	-	-	UJ	MS/MSD recoveries above QC criteria
460-200532	MW-22D	Nitrate as N	-	-	-	UJ	MS/MSD recoveries above QC criteria
460-200532	FDGW_011020	Nitrate as N	-	-	-	UJ	MS/MSD recoveries above QC criteria
460-200532	MP 19-1	Ammonia	0.45	0.45	0.45	U	Contamination in the rinsate blank
460-200532	MP 19-2	Ammonia	0.45	0.45	0.45	U	Contamination in the rinsate blank
460-200532	MP 16-2	Ammonia	-	2.4	2.4	U	Contamination in the rinsate blank
460-200532	MW-22D	Ammonia	-	2.2	2.2	U	Contamination in the rinsate blank
460-200532	MW-22D	Iron	-	-	-	J	FD RPD outside of QC criteria
460-200532	FDGW_011020	Iron	-	-	-	J	FD RPD outside of QC criteria
460-200532	FDGW_011020	Ammonia	-	2.1	2.1	U	Contamination in the rinsate blank
460-201031	MP 19-1	Phosphorus as P	0.21	0.21	0.21	UJ	Contamination in rinse blank. MS/MSD recoveries below QC criteria.
460-201031	FDGW_011720	Phosphorus as P	0.28	0.28	0.28	UJ	Contamination in rinse blank. MS/MSD recoveries below QC criteria.
460-201031	MP 19-1	Ammonia	0.1	-	0.1	U	Contamination in rinsate blank
460-201031	MW-22D	Phosphorus as P	0.29	0.29	0.29	UJ	Contamination in rinse blank. MS/MSD recoveries below QC criteria.
460-201031	MP 19-2	Ammonia	0.14	0.14	0.14	U	Contamination in rinsate blank
460-201031	MP 16-2	Nitrate as N	-	-	-	R	MS/MSD recoveries and RPD outside of QC criteria.
460-201031	FDGW_011720	Nitrate as N	-	-	-	UJ	MS/MSD recoveries and RPD outside of QC criteria.
460-201031	MP 19-1	Nitrate as N	-	-	-	UJ	MS/MSD recoveries and RPD outside of QC criteria.
460-201031	MP 19-2	Nitrate as N	-	-	-	UJ	MS/MSD recoveries and RPD outside of QC criteria.
460-201031	MW-22D	Nitrate as N	-	-	-	UJ	MS/MSD recoveries and RPD outside of QC criteria.
460-201031	FDGW_011720	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-201031	MP 16-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-201031	MP 19-1	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria

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Reviewed by: RMS



**TABLE B-2**  
**Enhanced Co-Metabolic Pilot Test Report - Carlstadt OU-3**  
**Qualifier Summary Table**  
**216 Paterson Plank NPL Site**  
**Carlstadt, New Jersey**

SDG	Sample Name	Constituent	New Result	New RL	New MDL	Qualifier	Reason
460-201031	MP 19-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-201031	MW-22D	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-201031	MP 19-2	Phosphorus as P	-	-	-	UJ	MS/MSD recoveries below QC criteria
460-201031	MP 16-2	Phosphorus as P	-	-	-	J-	MS/MSD recoveries below QC criteria.
460-201582-1	MP 19-1	Phosphorus as P	0.25	0.25	0.25	UJ	Contamination in rinse blank. MS/MSD recoveries below QC criteria.
460-201582-1	MP 19-2	Phosphorus as P	0.25	0.25	0.25	UJ	Contamination in rinse blank. MS/MSD recoveries below QC criteria.
460-201582-1	MW-22D	Phosphorus as P	0.25	0.25	0.25	UJ	Contamination in rinse blank. MS/MSD recoveries below QC criteria.
460-201582-1	FDGW_011720	Phosphorus as P	0.25	0.25	0.25	UJ	Contamination in rinse blank. MS/MSD recoveries below QC criteria.
460-201582-1	MP 16-2	Phosphorus as P	0.51	0.51	0.51	UJ	Contamination in rinse blank. MS/MSD recoveries below QC criteria.
460-201582-1	MP 19-2	1,4 dioxane	-	-	-	J+	Surrogate recovery above QC criteria
460-201582-1	MP 16-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-201582-1	MP 19-1	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-201582-1	MP 19-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-201582-1	MW-22D	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-201582-1	FDGW_011720	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-202083	MP 19-1	Phosphorus as P	0.19	0.19	0.19	UJ	Contamination in rinse blank. MS/MSD recoveries below QC criteria.
460-202083	MP 16-2	Phosphorus as P	-	0.41	0.41	UJ	Contamination in rinse blank. MS/MSD recoveries below QC criteria.
460-202083	MW-22D	Phosphorus as P	-	0.48	0.48	UJ	Contamination in rinse blank. MS/MSD recoveries below QC criteria.
460-202083	FDGW_013120	Phosphorus as P	-	0.48	0.48	UJ	Contamination in rinse blank. MS/MSD recoveries below QC criteria.
460-202083	MP 16-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-202083	MP 19-1	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-202083	MP 19-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-202083	MW-22D	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-202537	MW-22D	Phosphorus as P	-	-	-	J	FD RPD outside of QC criteria
460-202537	FDGW_020720	Phosphorus as P	-	-	-	J	FD RPD outside of QC criteria
460-202537	MP 16-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-202537	MP 19-1	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-202537	MP 19-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-202537	MW-22D	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-202537	FDGW_020720	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-203165	MP 16-2	Ammonia	-	-	-	J+	MS/MSD recoveries above QC criteria
460-203165	MP 19-1	Ammonia	-	-	-	J+	MS/MSD recoveries above QC criteria
460-203165	MW-22D	Ammonia	-	-	-	J+	MS/MSD recoveries above QC criteria
460-203165	FDGW_021420	Ammonia	-	-	-	J+	MS/MSD recoveries above QC criteria
460-203165	MW-22D	Phosphorus as P	-	-	-	J	FD RPD outside of QC criteria
460-203165	FDGW_021420	Phosphorus as P	-	-	-	J	FD RPD outside of QC criteria
460-203165	MP 16-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-203165	MP 19-1	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-203165	MP 19-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-203165	MW-22D	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-203165	FDGW_021420	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria

Created by: YJS  
Reviewed by: RMS



**TABLE B-2**  
**Enhanced Co-Metabolic Pilot Test Report - Carlstadt OU-3**  
**Qualifier Summary Table**  
**216 Paterson Plank NPL Site**  
**Carlstadt, New Jersey**

SDG	Sample Name	Constituent	New Result	New RL	New MDL	Qualifier	Reason
460-203165	MP 16-2	Iron	-	-	-	J-	MS/MSD recoveries below QC criteria
460-203165	MP 19-1	Iron	-	-	-	J-	MS/MSD recoveries below QC criteria
460-203165	MP 19-2	Iron	-	-	-	J-	MS/MSD recoveries below QC criteria
460-203165	MW-22D	Iron	-	-	-	J-	MS/MSD recoveries below QC criteria
460-203165	FDGW_021420	Iron	-	-	-	J-	MS/MSD recoveries below QC criteria
460-203523	MP 19-2	Nitrate as N	-	-	-	J-	MS/MSD did not recover (i.e., 0% Recovery)
460-203523	MP 16-2	Nitrate as N	-	-	-	R	MS/MSD did not recover (i.e., 0% Recovery)
460-203523	MP 19-1	Nitrate as N	-	-	-	UJ	MS/MSD did not recover (i.e., 0% Recovery)
460-203523	MW-22D	Nitrate as N	-	-	-	UJ	MS/MSD did not recover (i.e., 0% Recovery)
460-203523	FDGW_022120	Nitrate as N	-	-	-	UJ	MS/MSD did not recover (i.e., 0% Recovery)
460-203523	MW-22D	Phosphorus as P	-	-	-	J	FD RPD outside of QC criteria
460-203523	FDGW_022120	Phosphorus as P	-	-	-	J	FD RPD outside of QC criteria
460-203523	MP 16-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-203523	MP 19-1	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-203523	MP 19-2	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-203523	MW-22D	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
460-203523	FDGW_022120	Sulfate	-	-	-	J-	MS/MSD recoveries below QC criteria
All SDGs	All samples	All results	-	-	-	-	Laboratory applied U-qualifiers indicating non-detect results and J-qualifiers indicating results below the reporting limit are retained unless other qualifications are indicated in this table. All other laboratory qualifiers are removed.

**Abbreviations:**

CCV - Continuing Calibration Verification  
 CCVC - Continuing Calibration Verification - Closing  
 DL - Dilution  
 ECMB - Enhanced Co-Metabolic Bioremediation  
 FD - Field Duplicate  
 ICV - Initial Calibration Verification  
 MDL - Method Detection Limit  
 MS/MSD - Matrix Spike / Matrix Spike Duplicate  
 OU - Operable Unit  
 QC - Quality Control  
 RL - Reporting Limit  
 RPD - Relative Percent Difference  
 RRF - Relative Response Factor  
 SDG - Sample Delivery Group  
 VOC - Volatile Organic Compound

**Qualifiers:**

J: Estimated Result  
 J-: Estimated result; biased low  
 J+: Estimated result, biased high  
 R: Result Rejected  
 U: Non-Detect Result  
 UJ: Estimated, Non-Detect Result

Table B-3  
ECMB Pilot Test Baseline Validated Analytical Results - October 2019  
Carlstadt, New Jersey

Sample ID Sample Date N=Normal, FD=Field Duplicate		MP16-2 10/15/2019 N			MP19-1 10/18/2019 N			MP19-2 10/18/2019 N			MW-22D 10/15/2019 N			MW-22D 10/15/2019 FD		
Parameter	Unit	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL	Result	Qual	RDL
Volatile Organic Compounds																
1,1,1-Trichloroethane	ug/L		U	0.5	0.39	J	0.5	0.15	J	0.5		U	0.5		U	0.5
1,1,2,2-Tetrachloroethane	ug/L		R	0.5		U	0.5		U	0.5		U	0.5		U	0.5
1,1,2-Trichloroethane	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
1,1-Dichloroethane	ug/L	3.4	J-	0.5	0.37	J	0.5	0.19	J	0.5	0.5		0.5	0.36	J	0.5
1,1-Dichloroethene	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
1,2,3-Trichlorobenzene	ug/L		R	0.5		U	0.5		U	0.5		U	0.5		U	0.5
1,2,4-Trichlorobenzene	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
1,2-Dibromo-3-chloropropane	ug/L		R	0.5		U	0.5		U	0.5		U	0.5		U	0.5
1,2-Dibromoethane	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
1,2-Dichlorobenzene	ug/L		U	0.5	0.07	J	0.5		U	0.5	0.17	J	0.5	0.11	J	0.5
1,2-Dichloroethane	ug/L		U	0.5	1.1		0.5		U	0.5		U	0.5		U	0.5
1,2-Dichloropropane	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
1,3-Dichlorobenzene	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
1,4-Dichlorobenzene	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
2-Butanone	ug/L	3.5	J	5		U	5		U	5		U	5		U	5
2-Hexanone	ug/L		U	5		U	5		U	5		U	5		U	5
4-Methyl-2-pentanone	ug/L		U	5		U	5		U	5		U	5		U	5
Acetone	ug/L	24		5		U	9.5		U	5.9		U	13		U	6.7
Benzene	ug/L	0.65	J-	0.5	0.08	J	0.5		U	0.5		U	0.5		U	0.5
Bromochloromethane	ug/L		R	0.5		U	0.5		U	0.5		U	0.5		U	0.5
Bromodichloromethane	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
Bromoform	ug/L		R	0.5		U	0.5		U	0.5		U	0.5		U	0.5
Bromomethane	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
Carbon Disulfide	ug/L		U	0.5	0.18	J	0.5		U	0.5		U	0.5		U	0.5
Carbon Tetrachloride	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
Chlorobenzene	ug/L		U	0.5	0.08	J	0.5		U	0.5		U	0.5		U	0.5
Chloroethane	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
Chloroform	ug/L	4.2	J-	0.5	0.51		0.5	0.17	J	0.5		U	0.5		U	0.5
Chloromethane	ug/L		U	0.5	0.13	J	0.5	0.11	J	0.5		U	0.5		U	0.5
cis-1,2-Dichloroethene	ug/L		U	0.5	3.1		0.5		U	0.5		U	0.5		U	0.5
cis-1,3-Dichloropropene	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
Cyclohexane	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
Dibromochloromethane	ug/L		R	0.5		U	0.5		U	0.5		U	0.5		U	0.5
Dichlorodifluoromethane	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
Ethylbenzene	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
Freon 113	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
Isopropylbenzene	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
m,p-Xylenes	ug/L		U	0.5	0.16	J	0.5		U	0.5	0.2	J	0.5	0.11	J	0.5
Methyl Acetate	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
Methyl Cyclohexane	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
Methyl tert-Butyl Ether	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
Methylene Chloride	ug/L		U	0.5		U	0.92		U	0.5		U	0.5		U	0.5
o-Xylene	ug/L		U	0.5		U	0.5		U	0.5	0.08	J	0.5		U	0.5
Styrene	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
Tetrachloroethene	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
Toluene	ug/L		U	0.5		U	0.96		U	0.5	2.3	J	0.5	1.2	J	0.5
trans-1,2-Dichloroethene	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
trans-1,3-Dichloropropene	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
Trichloroethene	ug/L	0.82		0.5		U	0.53		U	0.85		U	0.5		U	0.5
Trichlorofluoromethane	ug/L		U	0.5		U	0.5		U	0.5		U	0.5		U	0.5
Vinyl Chloride	ug/L		U	0.5	1.2		0.5		U	0.5		U	0.5		U	0.5
Semivolatile Organic Compounds																
1,4-Dioxane	ug/L	2400		210	560		42	1000		84	730		80	630		41
Dissolved Gases																
Ethane	ug/L	NA			NA			3.1		0.1	NA			5.3		0.1
Ethene	ug/L	NA			NA			1.6		0.1	NA			0.37		0.1
Methane	ug/L	390		0.5	45	J	0.5	140		0.5	730	J	0.5	820		0.5
Propane	ug/L		U	0.1	0.31	J	0.1	NA			0.13	J	0.1	NA		
Wet Chemistry Parameters																
Ammonia	mg/L	2.6		0.1	0.1		0.1	0.27		0.1	0.14		0.1	0.13		0.1
Nitrate as N	mg/L	1.33		0.1	0.17		0.1		U	0.1		U	0.1		U	0.1
Phosphorus	mg/L	0.44		0.03	0.61	J	0.06	0.59	J	0.06	0.057		0.03	0.049		0.03
Sulfate	mg/L	391		30	NA			NA			233		12	221		60
Total Organic Carbon	mg/L	8.4		1	3		1	3.3		1	2.8		1	2.8		1
Total Metals																
Iron	ug/L	216		100	NA			NA			6830		100	6690		100
Sodium	ug/L	NA			290000		25000	339000		25000	NA			NA		

**Abbreviations**  
ECMB - Enhanced Co-Metabolic  
Bioremediation  
ID - Identification  
J - Estimated Result  
J- - Estimated Result; Low Bias  
mg/L - Milligrams per Liter  
NA - Not Analyzed  
Qual - Interpreted Qualifier  
R - Result Rejected  
RDL - Reporting Detection Limit  
U - Non-Detect Result  
ug/L - Micrograms per Liter

**APPENDIX C**

**USEPA EDD (on CD)**



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